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Railway Mechanical Engineer

September 1947

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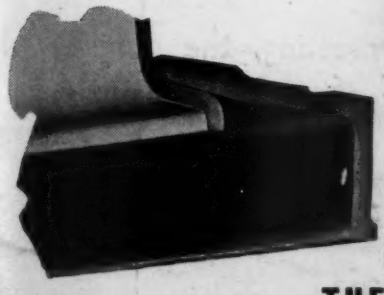

THE WINE RAILWAY APPLIANCE COMPANY
TOLEDO 9, OHIO

UNIT TRUCK
Says "Howdy" to the
CAR DEPARTMENT OFFICERS' ASSOCIATION
ASSEMBLED FOR THE COORDINATED CONVENTIONS
During the past five years your willingness to give Unit Truck a fair and impartial trial solely on its merits—has resulted in 59 railroads and private car lines placing 42,393 car sets of Unit-type Trucks in service or on order . . . . .
FOR THE FIRST SIX MONTHS OF 1946, 1 out of every 4 new freight cars ordered will be Unit-equipped

TIME FLIES

It seems like only yesterday that we greeted our friends of the Car Department Officers' Association on this very same page.

That was a year ago, and we had about 48,000 carsets of Unit Trucks in service or on order. Since then, more than 25,000 additional carsets were bought by the railroads and private car lines.

In other words, since your last meeting, the number of Unit Trucks sold was in excess of one half of our total sales from 1941 to 1946.

As the 1947 Coordinated Conventions roll around, we again say "Howdy."

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RAILWAY MECHANICAL ENGINEER

With which is incorporated the RAILWAY ELECTRICAL ENGINEER

(Names Registered, U. S. Patent Office)

Founded in 1832 as the American Rail-Road Journal

SEPTEMBER, 1947

Volume 121 *No. 9*

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A "Stand-out" in durable AB installations

Byers Wrought Iron Brake Pipe

As part of a new car building program, the Erie Railroad recently ordered 700—50-ton Box Cars, 600—50-ton Drop End Gondolas and 100—70-ton Covered Hoppers. The railroad specified wrought iron pipe for the AB brake piping on all these cars. The installation on one of the Covered Hoppers, built by Greenville Steel Car Company, is shown above. The pipe is Byers Wrought Iron.

With half a million or more AB brake installations in prospect in the near future, the savings possibilities of Byers Wrought Iron Brake Pipe, both in installation and in service, take on added importance and significance. Byers Wrought Iron Brake Pipe has shown its ability to stand the severe short-radius bends necessary during installation. The absence of "spring-back" simplifies fitting, and leaves the assembly free of harmful stresses. Finally, the hickory-like structure of wrought iron protects it against the premature fatigue failure that vibration and shock cause in ordinary vulnerable materials.

The desirable properties of Byers Wrought Iron come direct from the unique character of the material. Tiny fibers of glass-like silicate slag, threaded through the body of high-purity iron, give a structure something like that of a stranded wire cable. When corrosion is present, the fibers serve as baffles, to halt and diffuse the attack, and so discourage pitting.

Our General Catalog will give you full dimensional information on Byers Wrought Iron pipe.

A. M. Byers Co., Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, Salt Lake City, Seattle, San Francisco. Export Division: New York, N. Y.

CORROSION COSTS YOU MORE THAN WROUGHT IRON

BYERS
GENUINE WROUGHT IRON
TUBULAR AND HOT ROLLED PRODUCTS
ELECTRIC FURNACE QUALITY ALLOY AND STAINLESS STEEL PRODUCTS

RAILWAY
MECHANICAL ENGINEER

Machine Tools for Railroads

By V. P. Schmidt

Works engineer, Pennsylvania
Altoona, Pa.

THE railroads of this country, during the past 15 or 20 years, have made serious studies of transportation problems and as the result, many innovations in motive power and rolling stock equipment are now in service all over the country. For a period during the war, modernization of equipment was held in abeyance but since VE day this program has been accelerated and as a result many new designs and heavier types of motive power equipment are being considered.

Locomotives with four high-pressure cylinders, others employing the direct-drive steam turbine, steam-turbine-electric, as well as Diesel engines and gas-turbine driven equipment are being designed or are under construction. Similarly, extensive programs are under way in connection with the modernization of passenger-car equipment, where thought is being given to every comfort of the public by installing air-conditioning equipment, fluorescent lights, public address systems, spacious lounge rooms and modern seats that have been designed to provide the maximum comfort in either sitting or reclining posture.

The problems of shippers are being studied carefully and freight cars of greater tonnage capacity are being built. Many of these cars are equipped with auto loaders, racks and other special equipment to facilitate the expeditious handling of material from the plant to destination with minimum amount of crating involved and reduce loss and damage in transit.

As the result of the various improvements and new design of transportation equipment, motive-power men are confronted with the fact that the old type of machine tool equipment has more or less outlived its usefulness. The newer type of rolling stock requires extreme precision in the machining of the various details. These tolerances cannot be obtained with the old belt-driven type of machine-tool equipment. Over the past five years or more, the war has seriously impeded the development of craftsmen. The number of young men being employed as apprentices has been too small. Many of the skilled mechanics have retired or reached the retirement age and young men are not available to fill their positions.

Railroad management, therefore, is confronted with the following problems in connection with machine-tool purchases:

(1) Machines capable of machining within very close tolerances the new details now employed in locomotive and car construction; (2) machines so designed that they will reproduce repair parts accurately with a minimum amount of effort and skill; (3) machine tools designed with such speeds and feeds that high-speed steels and cemented-carbide tools may be used to produce the maximum number of repair parts per man-hour expended; and (4) the use of material-handling equipment for handling the rough stock from storage to the machine, through the machine, by a conveyor or other means and then the finished product to point of consumption.

Railroad management is, therefore, confronted with the necessity of making a more intelligent analysis of shop operating conditions and the selection of the proper machine tools, as well as scheduling new or repair parts through the shop in order to obtain the maximum productivity from new tools purchased.

Modern forging equipment will produce forgings within closer tolerances than has been possible previously which permits the selection of automatic or semi-automatic machine tools capable of using extremely high speeds and feeds in the machining operations. Many forgings are being produced on the new machines within such tolerances that they may be finished completely on modern hydraulic-driven grinding equipment. It, therefore, follows that this type of grinding equipment should be arranged for automatic truing of the grinding wheels and micrometer sizing equipment. Necessary conveyor equipment should be provided for feeding the raw ma-

terial through the machines. The minimum delay in floor-to-floor time is thereby made possible.

The modern locomotive, in its design, employs many details made of alloy metals. In order to obtain the maximum strength per pound of material used, the automatic thread grinder has a definite place in the manufacturing of the necessary repair parts for air-conditioning and poppet-valve threaded details.

It is not uncommon to find in the railroad shop's com-

plement of tools old belt-driven lathes of the change-gear types which may be 40 years old or more. These machines are not suitable for high production using the modern cutting tool steels and do require the more skilled operators to perform satisfactory work. Consideration is now being given by the shop supervision to heavy production engine lathes with hardened ways, hardened and ground steel gears, tool carriage of ample proportion and turret tool post. Such machines should be equipped with anti-friction bearings throughout, and with rapid power traverse, dynamic braking and substantial taper attachments.

Automatic duplicating equipment may show surpris-

ing economies although the number of pieces of a particular kind to be produced may be in small lots.

The use of turret lathes is being extended with surprising results, especially if of the same general construction as engine lathes, further improved with speed selectors and air chucks. At central repair shops, many locomotive and car details may be produced on automatic turret lathes at extremely low costs. These machines must be equipped with automatic bar feeding or chucking arrangements, conveyors for removing the chips, and the proper material-handling facilities.

The art of manufacturing high-speed drills has opened a field for drilling operations. Modern drill presses of the radial or column drill types, having dial indicators showing the proper speeds and feeds for operating drills, will not only increase the number of holes drilled per man-hour but will reduce the drill cost. In this connection, a desirable addition to the drill press which would indicate when the drill is becoming dull, requiring excessive horsepower would be a device to ring a bell or stop the machine until the tool has been properly dressed. This feature not only applies to drill presses, but all modern metal-cutting equipment should be equipped with devices to indicate whether or not the tools are cutting properly. This would pay big dividends in cutting tool maintenance.

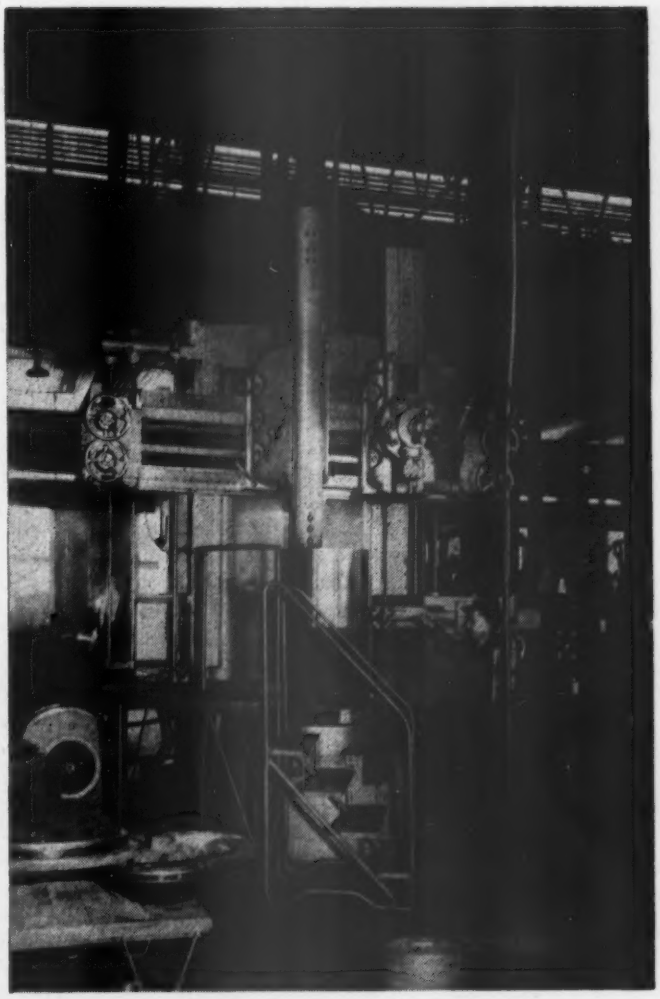
With the introduction of air-conditioning equipment, Diesel locomotives, anti-friction-bearing side rods, and redesign of valve-motion parts, serious consideration is being given to the purchase of hydraulic-driven milling-machine equipment of the single-spindle or multi-spindle type equipped with duplicator or magnetic tracer control. One modern machine of this type may replace several old, large, clumsy machines and may tend to loosen up available shop floor space. Machines of this type show substantial savings in that the use of the duplicator or tracer control eliminates the necessity of laying out each individual piece.

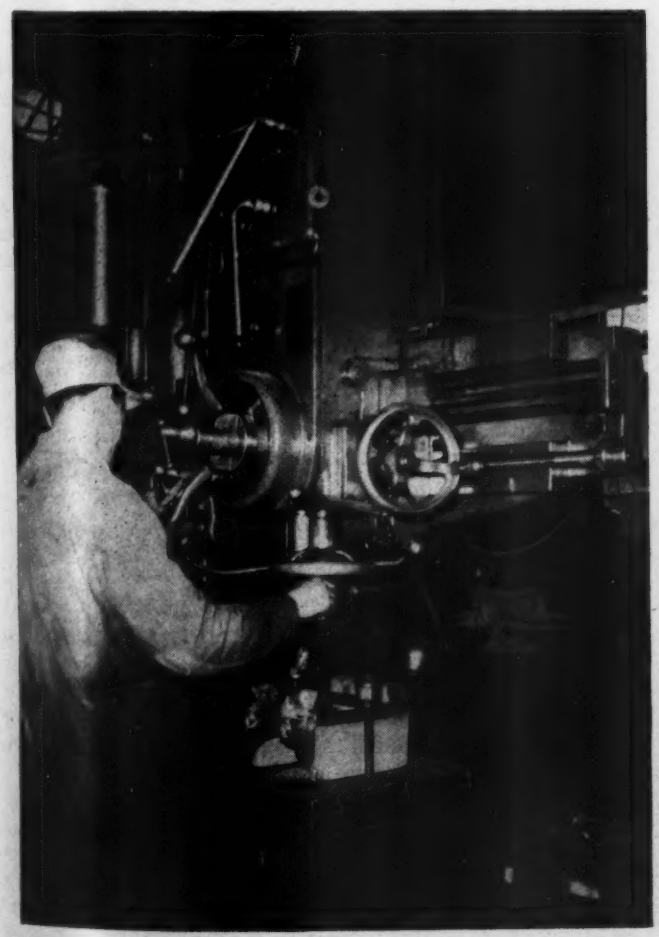
Radical changes in the design and manner of production of locomotive cylinders have been made. The old cast-iron, small bore, slide-valve cylinder has been replaced with the cast-steel or all-welded cylinder with the piston or poppet-valve design and, instead of a three-

piece locomotive cylinder, many of these cylinders are produced in one piece. The method of machining the cylinders is very much the same as obtained more than twenty years ago, involving the use of boring mills, radial drills and planers. In order to machine new or repair cylinders, serious consideration is being given to the purchase of a modern table type, horizontal boring, drilling and milling machine. A machine of this type will permit the laying-out of the cylinder and involve only one set up after which all machining operations may be performed. Care should be exercised in the selection of a machine of this type so that it would have the necessary capacity for machining Diesel-locomotive crank cases.

Many locomotives now in service have the cylinders cast integral with the bed and, at the present time, only a series of portable machines are available for the repairing of these frames and cylinders. For this machining operation, a large platen, 75 to 100 ft. long and wide enough to take the complete frame with the two post mills, one on either side to perform a drilling, milling and boring operation, will be required.

Locomotive wheel shops are in need of modern equipment for repairing of wheels, in order to run out this equipment within the proper tolerances, concentricity and finish of tread, suitable for the increased axle loads and speeds at which the locomotives of today operate. Many of the old wheel lathes, boring machines, quartering and journal lathes should be scrapped and replaced with high-speed machine tool equipment permitting the use of high-speed steel or cemented-carbide cutters. Old hydraulically-driven wheel presses should be replaced with 600- or 800-ton modern self-contained hydraulic or oil geared-drive presses, with resistor bars of the proper proportion to take care of the increased axle diameters and also permit the removal of wheels from axles equipped with anti-friction driving boxes. The old





method of removing tires by gas or oil should be replaced with induction or electric tire-heating equipment.

The wheel machinery in the railroad car shops is certainly in need of replacement with modern equipment. High-speed, hydraulic-cycling car-wheel borers, modern 52-in. mounted car-wheel lathes, as well as double-end axle lathes, journal lathes, heavy-duty car-wheel contour-grinding machines and car-wheel presses, which will facilitate moving car wheels through the machine, will materially reduce the operating cost in the wheel shops. The replacement of obsolete wheel machine tools with modern tools should be further augmented by conveyors and other material-handling equipment.

There is a definite need for modernizing and replacing old forging machinery in the car shops by installing forging machines in all capacities from one- to six-inch, as well as modern motor-driven hammers, 1,000- to 3,000-lb. capacity.

In the large central car-repair shops where new as well as repair cars are handled, automatic submerged-type welding machines are being operated at speeds of approximately 100 in. a minute of welding.

There is definitely a trend to an all-welded steel passenger car and freight car, which will reduce considerably the amount of forming of steel shapes. There are in service, however, many antiquated car forming presses which may have been made from old brake cylinders or other devices. Careful study of these facilities will indicate that modern mechanical or self-contained hydraulic presses will materially increase the productivity per man-hour expended. Consideration should be given also to the purchase of automatic tracer-type oxy-acetylene cutting equipment. Recently there has been developed

(*Continued on page 466*)

Programs of Meetings To September 15 to 25

THE Air Brake Association, which has recently become the fifth member of the Coordinated Associations, will hold its first meeting since 1930 at Chicago during the meetings of the other Coordinated Associations at the Hotel Sherman, Chicago, September 15, 16, 17, and 18. It will join with the Coordinated Associations in their opening session at 1:30 p. m. on Monday, September 15. On Tuesday morning, it will meet jointly with the Locomotive Maintenance Officers' Association for the consideration of a report on air brakes and in the afternoon with the Railway Fuel and Traveling Engineers' Association for the consideration of reports on the handling of long freight and passenger trains and the relation of wheel characteristics to sliding. Its program, as well as that of the Locomotive Maintenance Officers' Association, will be concluded Wednesday afternoon, September 17.

The programs of the Coordinated Associations and of the Machine Tool Congress, which will hold a series of evening technical sessions in several of the Chicago hotels from September 17 to 25, follow.

Coordinated Associations

HOTEL SHERMAN, CHICAGO
Joint sessions — Grand Ball Room

Monday, September 15

1:30 p.m.

Address by J. W. Barriger, president, C.I. & L.

3:00 p.m.

Inspection of exhibits of Allied Railway Supply Association, Inc.

Wednesday, September 17

2:00 p.m.

(Except the Air Brake Association)

The Supervisor's Responsibility for Safety (L.M.O.A. report), W. H. Roberts (chairman), superintendent of safety, C. & N. W.
Training Understudies and Promoting Supervisors (L.M.O.A. report), H. J. Schulthess (chairman), chief of personnel, D. & R. G. W.
Training of Diesel Engineers and Firemen (R. F. & T. E. A. report), W. D. Quarles (chairman), assistant chief motive power, A. C. L.
Front Ends, Grates, Ashpans, and Arches (R. F. & T. E. A. report), S. A. Tilbury (chairman), fuel supervisor, A. T. & S. F.

Locomotive Maintenance Officers' Association

Monday, September 15

8:00 a.m.

Registration

1:30 p.m.

Joint session

Tuesday, September 16

9 a.m.

Report of Committee on Diesel Maintenance, T. T. Blickle (chairman), master mechanic, Western Division, A.T. & S.F. Topic: The Maintenance of Diesel-Electric Locomotives and Factors Related To It

Report of Committee on Air Brakes, R. J. Dewsbury (chairman), assistant general air-brake inspector, C. & O. Topic: Relation Between Proper Protection of Locomotive Air Brake Devices and Their Maintenance
Report of Committee on Forging and Heat Treating, W. H. Ohnesorge (chairman), superintendent of shops, B. & M. Topic: Forging of Locomotive Running-Gear Parts
Report of Committee on Welding, A. W. Johnson (chairman), supervisor of welding, E. J. & E. Topic: Improper Preparation and Welding Practice

Wednesday, September 17

9 a.m.

Report of Committee on Shop Tools, H. H. Magill (chairman), superintendent locomotive and car shops, C. & N. W. Topic: Modern Machine Tools and Methods
Report of Committee on Improved Steam Locomotive Maintenance Practices, T. J. Lyon (chairman), assistant to general superintendent motive power, N.Y.C. Topic: Shop Modernization for Handling Present and Future Motive Power

2 p.m.

Joint session

Car Department Officers' Association

Monday, September 15

8:00 a.m.

Registration

1:30 p.m.

Joint session

Tuesday, September 16

9 a.m.

Address by President G. R. Andersen
Loading Rules report
Interchange Rules report

2 p.m.

Address by L. L. White, vice-president, C. & N.W.
Car Department Automotive Equipment report

Wednesday, September 17

9 a.m.

Freight Car for Modern Requirements, report
Passenger-Car Truck Maintenance, report

2 p.m.

Joint session

Thursday, September 18

9 a.m.

Address by a railway executive officer
Passenger-Car Painting and Its Maintenance, report

2 p.m.

Car Lubrication Practices, report
Election of officers

Air Brake Association

Monday, September 15

9:00 a.m.

Registration

1:30 p.m.

Joint session

Tuesday, September 16

10 a.m.

President's address
Report of Committee on Air Brakes (in session with Locomotive Maintenance Officers' Association)

2 p.m.

Handling of Long Freight and Passenger Trains and the Relation of Wheel Characteristics to Sliding (in session with the Railway Fuel and Traveling Engineers' Association)

Wednesday, September 17

10 a.m.

No. 6-BL Brake Equipment
Aftercoolers and Automatic Drain Valves
Type F-2 Lubricators
The Effect of Heating Sheds on Air-Brake Devices

2 p.m.

Testing Electro-Pneumatic Brakes on Lightweight Trains
Report of committees
Election of officers

To Be Held in Chicago
25, Inclusive

Master Boiler Makers' Association

Monday, September 15

9:30 a.m.

Registration

1:30 p.m.

Joint session

Tuesday, September 16

9:30 a.m.

Address by President Frank A. Longo
Address by D. V. Gonder, general superintendent motive power and car equipment, Canadian National
Topic No. 1: Study of I.C.C. Rules and Regulations, Carl A. Harper (chairman), general boiler inspector, C.C.C. & St.L.
Committee on Law, S. G. Longo (chairman), general boiler foreman, So. Pac.

2 p.m.

Paper, with illustrations: New Development in Locomotive Boiler Design, by A. J. Townsend, vice-president in charge of engineering, Lima Locomotive Works, and Arthur Williams, vice-president, Superheater Company
Topic No. 2: Fusion Welding and Cutting as Used with Design, Fabrication and Maintenance of Steam Locomotive Boilers and Tenders, Edward H. Heidel (chairman), general boiler foreman, C.M.St.P. & P.
Report of the Executive Board

Wednesday, September 17

9 a.m.

Address by C. E. Pond, assistant to superintendent motive power, N. & W.
Topic No. 3: Recommended Practice for Staybolt Application and Maintenance, G. R. Greenslade (chairman), director of research, Flannery Bolt Company
1—Tolerances used with taps and staybolts
2—Tools used with threading, application, and maintenance of steel and other materials, with various types of staybolts
Topic No. 4: Application and Maintenance of Flues, Tubes, and Arch Tubes, E. H. Gilley (chairman), general boiler foreman, Grand Trunk
1—Tools and methods used with the renewing of flues, tubes and arch tubes
2—Tools and methods used with the safe-ending of flues and tubes
3—Tools and methods used with the application and maintenance of flues, tubes, and arch tubes
Election of officers.

2 p.m.

Joint session

Thursday, September 18

9 a.m.

New Type Locomotive Boiler, with illustrations, by H. L. Miller, research engineer, Republic Steel Corporation
Topic No. 5: What Can Be Recommended to Overcome the Cracking of Boiler Shell Sheets at the Rivet Seams and Other Places which Develop in Present-Day Steam Boilers, Ray McBrian (chairman), engineer standards and research, D. & R.G.W.
Report of Secretary-treasurer

2 p.m.

Paper on Cinder Cutting of Locomotive Parts
Report of Committee on Resolutions
Report of Committee on Memorials
Installation of officers
Good of the Association

Railway Fuel and Traveling Engineers' Association

Monday, September 15

8:00 a.m.

Registration

1:30 p.m.

Joint Session

Tuesday, September 16

9 a.m.

Address by President W. C. Shove
Secretary-treasurer's report
Address by J. D. Loftis, chief motive power and equipment, A.C.L.
Address by W. A. Callison, vice president, American Locomotive Company. Subject: The Diesel Locomotive
Address by P. H. Hatch, general mechanical superintendent, N.Y. N.H. & H. Subject: Diesel Operation

2 p.m.

Air brake report, W. R. Sugg (chairman) General Supervisor air brakes and lubrication, Mo. Pac:
A—Handling heavy passenger trains of 12 or more cars
B—Handling heavy freight trains of 75 or more cars
C—Explanation and description of No. 24 RL brake equipment, by C. D. Stewart, vice-president, Westinghouse Air Brake Company

Wednesday, September 17

9 a.m.

Report: The Unit Cost of Coal for Locomotives, A. A. Raymond (chairman), superintendent fuel and locomotive performance, N.Y.C.
Report: Modern Coaling Stations, Glenn Warner (chairman), fuel supervisor, Pere Marquette
Address: The Coal Situation, by R. J. Ireland, Jr., president, Hanna Coal Company
Election of officers

2 p.m.

Joint session

Thursday, September 18

9 a.m.

Report: Valve motion, W. C. Wardwell (chairman), master mechanic, N.Y.C.
Report: Coal preparation, M. B. Adamson (chairman), C.R.I. & P.
Report: Lubrication of locomotives, E. E. Chapman (chairman), mechanical assistant (research and engineering), A.T. & S.F.
Report: Smoke abatement, by G. B. Curtis (chairman), R.F. & P.

Machine Tool Congress

Wednesday, September 17

La Salle Hotel

Democracy with a Gun in Her Ribs, by Fulton Lewis, Jr., news commentator. *Sponsor*—American Machine Tool Distributors' Association

Thursday, September 18

Continental Hotel

Form Grinding, by J. I. Wilson, Thompson Grinder Company
Fabricated Construction in Machine Tools, by James F. Lincoln, president, Lincoln Electric Company
Sponsor—American Society of Mechanical Engineers

Friday, September 19

Hotel Sherman

Turning Points in the Metalworking Industry, by Myron S. Curtis, assistant director of engineering, Warner & Swasey Co.
When and How to Use Cast Iron, by T. E. Egan, chief metallurgist, Cooper-Bessemer Corporation
Sponsors—American Society of Tool Engineers and American Foundrymen's Association

Monday, September 22

Palmer House

Address by Charles F. Kettering, research consultant, General Motors Corporation
Sponsor—National Electrical Manufacturers Association

Tuesday, September 23

Civic Opera Building

Machine Tools and the Philosophy of Production, by George Habicht, Jr., president, Marshall & Huschart Machinery Company
Sponsor—Chicago Technical Societies Council

Wednesday, September 24

Continental Hotel

Practice and Theory in Carbide Milling, by Michael Field, Cincinnati Milling Machine Company
Recent Developments in Carbide Application, by J. R. Longwell and Fred W. Lucht, Carboloy Company
Sponsor—American Society of Mechanical Engineers

Thursday, September 25

Knickerbocker Hotel

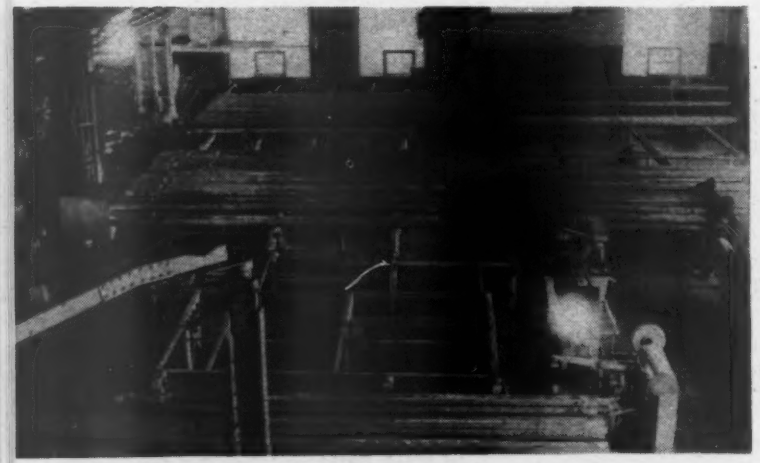
A Trip Through the Machine Tool Show, by Joseph Geschelin, Detroit editor, Automotive Industries
Sponsor—Society of Automotive Engineers

B. & O.'s Semi-Automatic

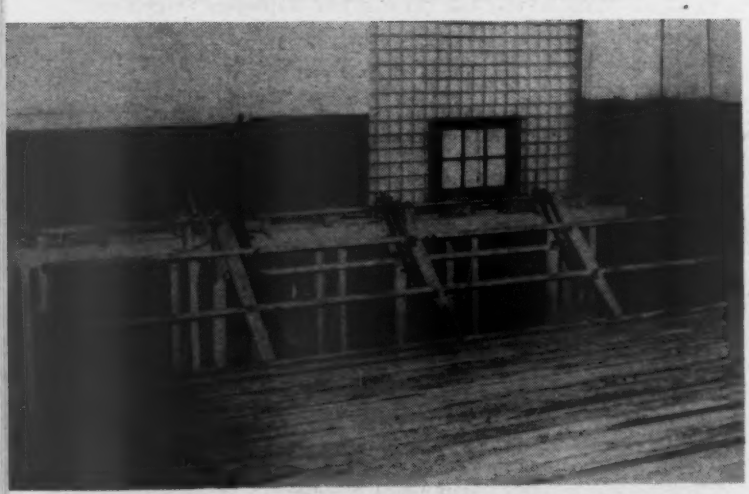
A five-to-one reduction in man-hours results from the complete revamping of flue-shop facilities — Changes include the installation of a new flue-cleaning

AN average of a flue a minute can be completely reconditioned by three men at the new flue-shop facilities of the Baltimore & Ohio at its Cumberland, Md., back shop. This production time includes handling both the small tubes and the larger superheater flues and embraces all operations from the initial inspection to the delivery of the tube or flue to the ready-to-go rack. Before the new installation was made a total of 120 man-hours was required to turn out a set of 232 tubes and 53 flues; now, the same job can be done with the expenditure of only 15 man-hours.

At the present time the shop force is comprised of a man inspecting the flues, a man welding and rolling the safe ends and a man handling the swedging operations. Further improvements, to be described later, will convert the swedging from a



A general view of the flue shop—Flues and tubes are placed on the gravity conveyor at the right and feed into the chain conveyor located at the right back corner of the shop—After passing through the flue-cleaning machine, rear center, the flues move down the left side of the shop—First, one end of the flue is cut off by a rocker-type friction saw and then they are carried successively by conveyors to the welder and roller, the swedger, and finally to the expander, right foreground



Flues from a locomotive are brought to the shop by a traveling crane and placed on a gravity conveyor where they are inspected and sub-standard flues are removed and scrapped—Picked up by the chain conveyor, driven by a 3-hp. electric motor through variable-speed reduction gears, a flue drops onto constantly revolving rollers and moves toward the flue cleaner—In dropping, the flue depresses two separate spring-loaded arms; either will stop the conveyor motor by operating a switch.

The flue is part way through the flue cleaner—Note that the flap at the machine exit is raised; this flap operates a control switch which must be down at the same time the two control-switch arms at the loading side are in raised positions before the chain loading-conveyor motor is energized and, therefore, a flue must be clear of the flue cleaner before another flue can be placed in loading position—The flap is to be changed to the entering side to reduce the interval between flues

Cumberland Flue Shop

machine, the application of automatic controls to material-handling equipment and machine tools and a shop layout that produces a straight-line work flow

manual to an automatic operation and will effect changes that will either increase the quality of the work turned out or will decrease the time required for the performance of each operation.

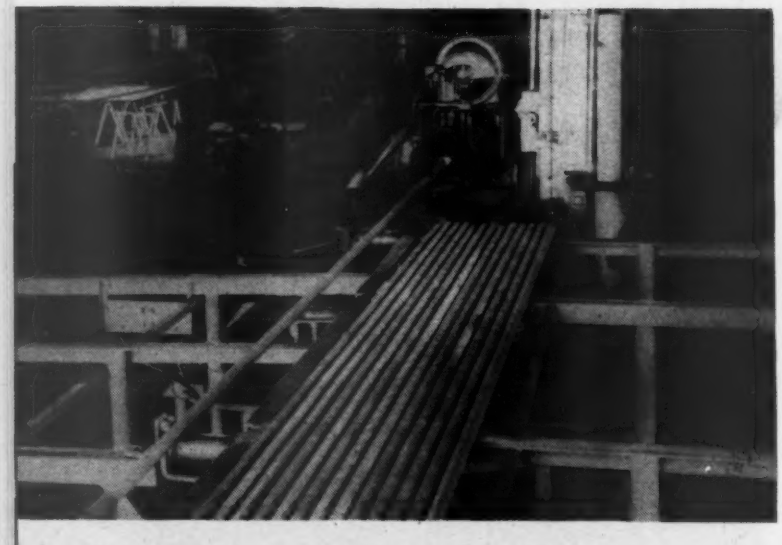
A combination of four main factors are responsible for the production speed-up. These are the rearrangement of the shop equipment layout that permits the work to move progressively through the shop in accordance with the natural sequence of operations, the installation of a conveying system with automatic controls, the application of automatic features to four of the six principal machine tools and the acquisition of a flue-cleaning machine that makes possible the handling of each flue as a unit in contrast to the tumbling method in which a complete set was cleaned as a unit. The procedure is presented here in picture form.

Completely through the flue cleaner the flue continues until it hits a combination stop and wing switch, the latter controlling a 3-hp. electric motor driving the unloading device, rotating cam-shaped arms that lift the flue off the rollers and drop it on a gravity conveyor taking the flue to the first cut-off saw—The flue is shown on the unloading device which rotates 180 deg. and stops automatically ready to pick up the next flue—In order to increase operating speed, a pneumatic lift will be substituted for the present unloading device.

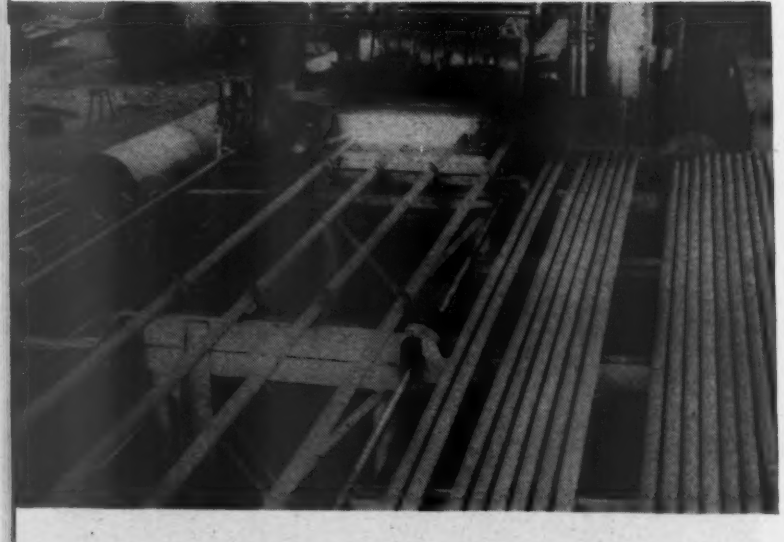
Dropping into rollers at the first cut-off saw the flue depresses two spring-loaded levers controlling electric switches—One switch operates an electro-pneumatic control valve that lets compressed air into the cylinders depressing onto the flue—Both of the saws used in the shop are identical, being rocker-type friction saws driven by 25-hp. motors—The rollers are powered by a 2-hp. motor through reduction gears—The next flue may be seen at the right; it is part way through the flue cleaner

Cutting off about a 3-in. length at the end of the flue the saw continues to its lowest position where it trips an electric switch controlling the motor-driven rollers—The flue moves away from the saw and releases one switch arm which raises the saw, stops the motor driving the rolls, and energizes two pneumatic jacks that lift the flue onto the next gravity conveyor—As the flue drops off it releases the second switch controlling return of the pneumatic jacks to the depressed position

Rolling down the gravity conveyor from the first cut-off saw the flue drops onto rollers and is pulled into the welding machine by the operator—Here the safe end is welded to the flue and then the welder is opened and the flue is guided into the machine where the weld is rolled—At this position a centralized control panel will be established from which the welder can start or stop any conveyor or machine in the shop



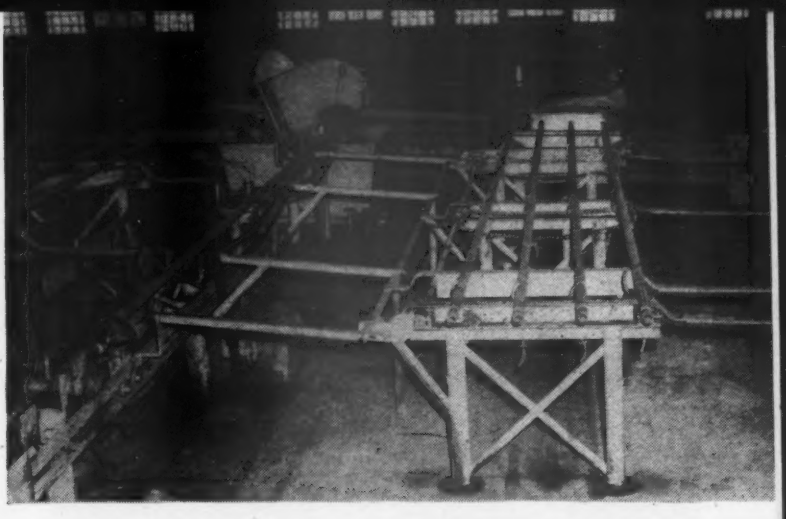
In this picture the welding machine is shown in open position and the flue has been drawn through to the finish rollers located immediately in back of and in line with the welding machine—Another improvement being made at this position is the powering of the rollers at the welding position and the connecting up of the pneumatic jacks, already installed, to raise the flues to the next gravity conveyor, now done by the welder operator



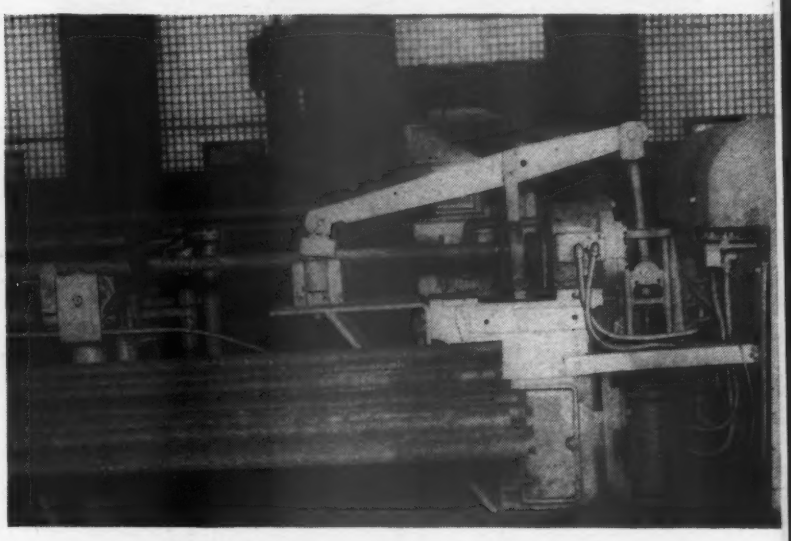
A chain conveyor picks up the flue from the gravity conveyor and carries it through an oil-fired furnace where the end is heated preparatory to swedging—Timed to pass the flue through the furnace at a speed that raises the end to the correct temperature for swedging the chain conveyor drops the flue onto a gravity conveyor on which the flue rolls to the swedging machine—While the swedging operation is now handled manually it is planned to make this operation wholly automatic

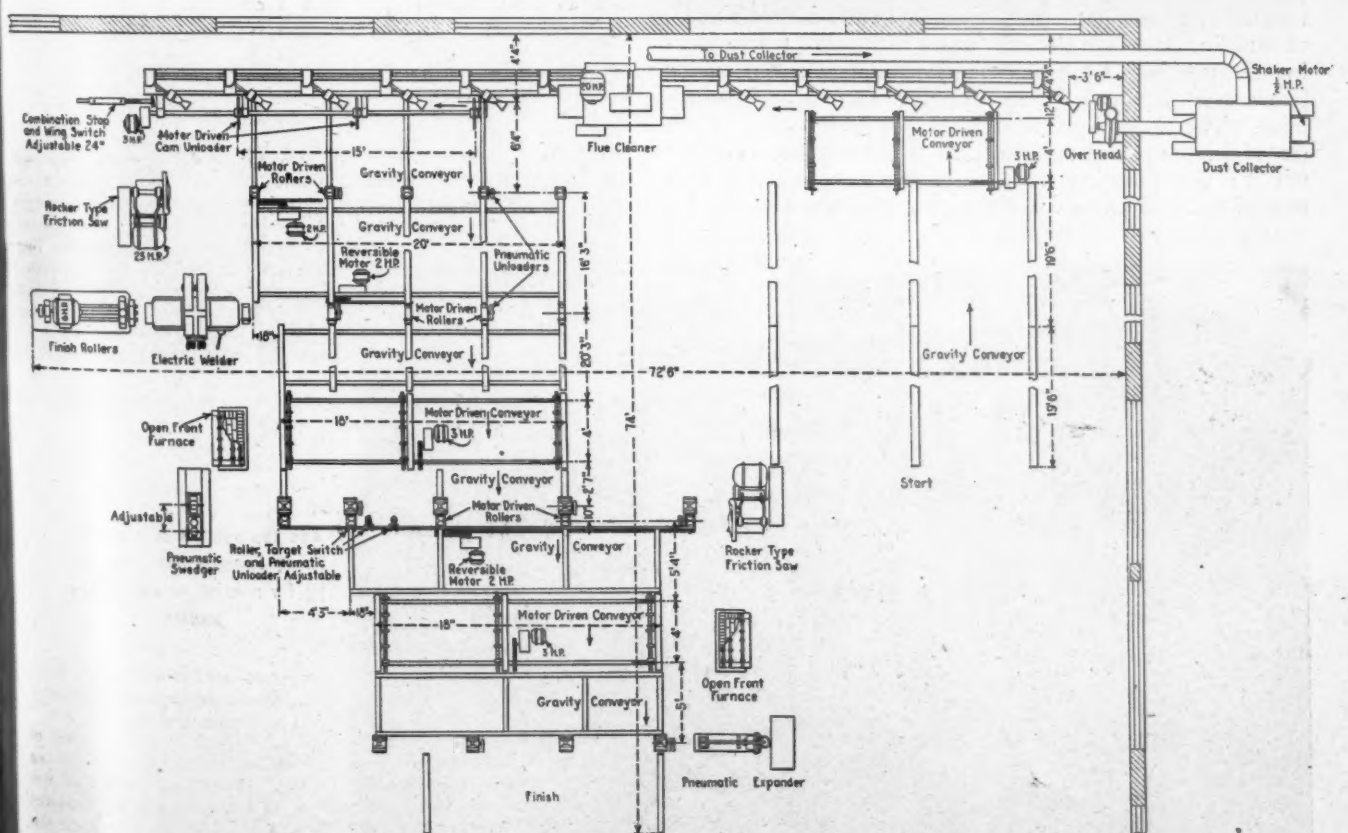
After swedging, pneumatic jacks lift the flue onto a set of rollers that convey the flue to the second cut-off saw—As the flue drops onto these rollers it rotates a counterweighted arm with a target switch on one end—In rotating, the arm operates a control switch that starts the motor driving the rollers and the flue moves toward the second cut-off saw where the flue is cut to length—As the flue travels down the rollers it passes by the counterweighted arm and the arm raises, thus permitting target switch to come into alignment with the rollers

As the counterweighted arm raises it operates controls that stop the motor driving the rolls, then reverses it and the flue moves backward until the flue end hits the target switch as shown in the photograph—This switch is a combination stop and control that first makes certain the flue will be cut to the correct length and, second, operates the controls that lowers the saw to the cutting position—When the saw is depressed completely it actuates the control of the jacks which throw the flue onto another gravity conveyor taking it to a chain conveyor which carries the flue through the second end-heating furnace



From the end-heating furnace the flue drops onto a gravity conveyor on which it rolls to the expander—As the flue drops onto the rolls at the expander it operates a trip switch that sets the motor driving the four cams in motion—One cam controls the cut-out switch that will stop the motor—The second moves a limit switch that controls the air cylinder operating the clamp holding the flue firmly; the third operates the expander plunger die so it enters and expands the flue end and then retracts—The fourth operates the pneumatic lift that dumps the flue in the cradle holding the finished flues





The layout of the machine tools and material-handling equipment—The arrows indicate the direction of the work flow—Conveyor frames are made of ½-in. by 4-in. angle iron and are supported on posts made from 4-in. and 5-in. flues, with all parts welded together

Assembling Box Cars at Reading

Shops carrying out program of 1,000 A. A. R. 40-ft. 6-in. cars at eight a day—Jigs and lifting devices aid the operations

The jig for assembling two end sections holds ten ends

Each air brake assembly tray holds a complete set of parts and is placed at each car

THE Reading, currently engaged in a program of building 1,000 40-ft.-6-in. box cars, employs some interesting and efficient car-shop procedures which deviate from established practice. The procedures involve the use of jigs, tools, lifting apparatus, and scaffolding arrangements. They are used in conjunction with a spot system of building in which the cars move along two tracks during the process of completion. A third track is used for truck assembly and for making the various sub-assemblies. The assembly line moves in a daily cycle. Each day eight completed cars, four on each track, are switched out to the painting tracks, partially completed cars moved up, and parts for eight new cars are brought in.

The cycle begins at 4 p.m. with the start of the night shift. Two groups of four completed underframes are wheeled in on assembled trucks. The sides, less the doors and miscellaneous appliances, are brought into the shop on flat cars. The ends, which are received in two

The top section of a car end being lowered into the end jig for riveting to end bottom section

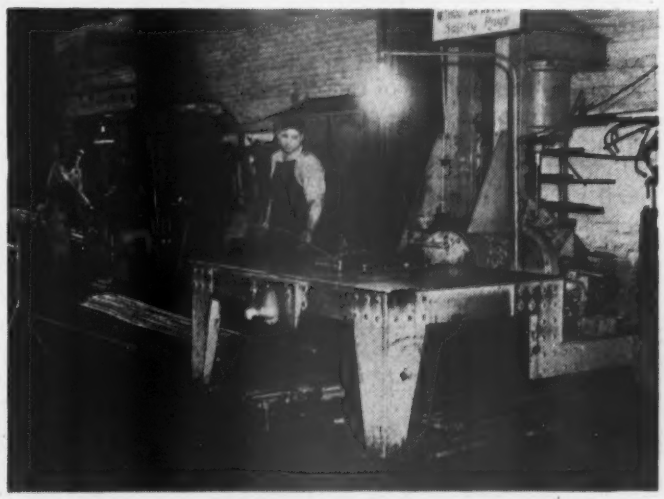
By bolting the scaffolding support in the holes in the door post the workmen are given additional room to move about in the performance of their duties

sections, are brought into the shop in gondola cars. They are deposited near a special rack which is used for assembling the sections.

The sides and ends are rough hung by the night gang to permit the workmen on the day shift to start work upon their arrival. The ends which the night gang hangs are those that were assembled by workers on the previous day shift. In rough hanging, the sides and ends are secured by six to eight bolts per side and eight bolts per end.

The day gang performs the assembly-line work on the cars. As there are more operations than there is room in the shop to spot the car, several operations are overlapped in each spot. So that different gangs will not interfere with each other, each works on a different car in the spotted group of four cars on the one track. In this way all the construction work can be completed in the thirteen car length space available in the shop.

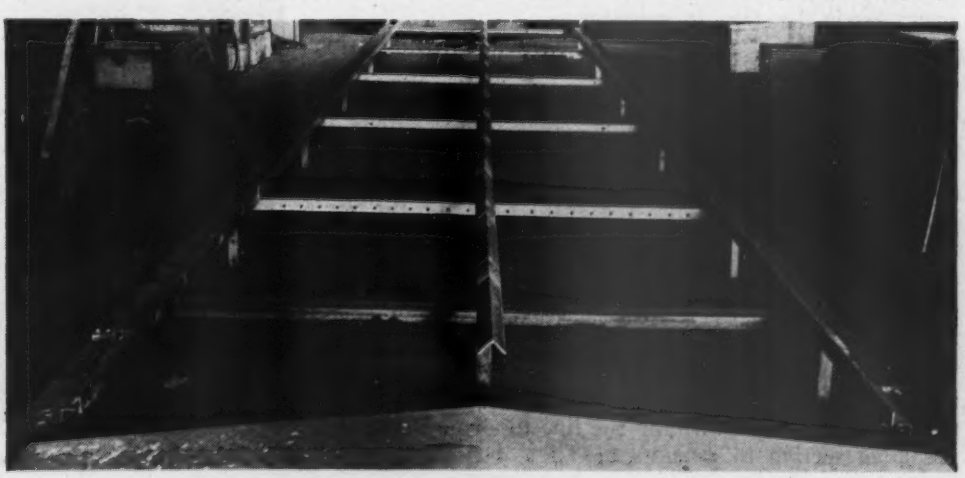
In the first position the roof is set in place, the door tracks applied with bolts, the doors hung, and everything drawn together. The sides, underframes, ends, and roofs are fitted and reamed. AB brake parts, coupler yokes and draft gears are applied. While reaming the sides and ends, the roof, which has been assembled separately, is set in place. While riveting the sides and the ends to the underframe and to each other the roof joint at the side plate is reamed. Then the roof is riveted.



Pipe bending apparatus for shaping the all-welded train line

Pipe of all types that has been bent to shape is stored neatly in racks for use as needed

Two simple but effective lifting devices are employed in conjunction with the overhead crane for performing the first-position operations. For transporting the door, and for raising and lowering it into place, a Z-bar is used. The bar holds the door firmly by the engagement of the flange with the channel of the door top. This engagement can be made or released in a few seconds. The bar hangs in a horizontal position as a result of its manner of suspension. It is joined to the lower extremities of



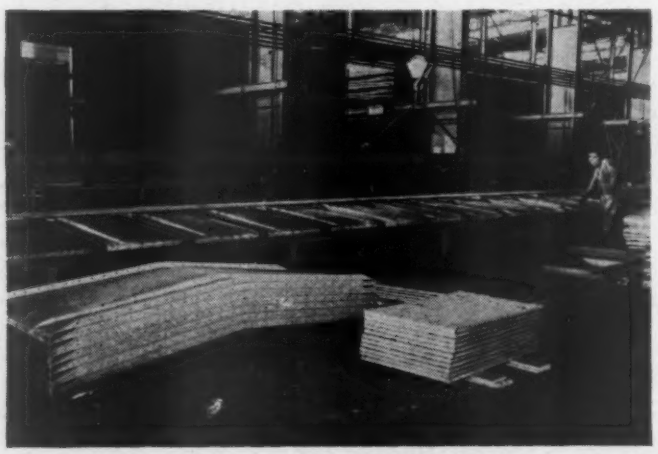
Roof jig on which the prefabricated galvanized sheets are laid out and riveted

Rivets are driven in about one second each by a compression riveter

two chains set several feet apart. The chains rise at an angle, and the top link of each is joined to the ring which fits over the hook of the crane.

The roof-lifting device comprises an I-beam with six individual lifting bars suspended from it. These bars, of small round stock, slip under the running board on the roof. When reengaged with the I-beam, these bars lift the roof.

Small parts, such as corner caps, push-pole pockets,



A completed roof about to be lifted by the running board lifting bar—The hooks from the large I-beam engage eyes assembled to the small bars—The hooks fit through open spaces in the running board

previously assembled ladders and sill steps are applied in this position. Couplers are not applied until the last operation in the shop, to save space.

A complete set of air-brake materials for application to the valve, cylinder and reservoir are placed at each car. These materials, including all necessary bolts, nuts, washers, elbows, couplings, etc., are contained in a tray which is stocked convenient to the point from which the application of the parts to the car is made.

The method of applying the scaffolding for the roof riveting allows virtually unimpeded working space within the car for the men performing jobs on the sides and ends. Metal bars which extend across the car are bolted to the holes in the door posts. Boards are laid on the transverse metal bars for the roof riveters to stand on.

An all-welded train line, with the exception of the nipple at each end, is installed on these box cars. The method employed in forming the line to shape is to bend a sample section to a template. The bending is done cold, after which the stresses in the bent section are checked. If there is no strain in line, the required number of pipe sections are bent and stored until needed for application to the cars.

The roof is assembled from eleven sections of galvanized pressed sheets purchased prefabricated. The sections are laid out on the jig, the outside carlines or seam caps applied to the joints, and the rivet holes lined up with drifts. The rivets, after being heated and inserted in the line-up holes, are driven with a pneumatic squeeze riveter.

The jig on which the roof is laid out and assembled stands about 1½ ft. off the floor on ⅜-in. by 3-in. angles. There are two channels that run lengthwise and serve to contain the roof sections between their inside flanges. The outside flanges serve as guide rails for the longitudinal-travel wheels of the squeeze-riveting apparatus. The channel opening is also used to hold hammers, drifts and other small tools when not in use.

The jig structure is held together by six transverse angles which connect the channels. Running lengthwise down the center is an angle section that supports the peak of the roof. This angle is set above the position of the roof on the transverse angles by an amount equal to the vertical difference in the height of the roof between these two points. It is set with its sides at a 45-deg angle and with the point of convergence of the sides at the top.

The supporting framing for the squeeze-riveting opera-

(*Continued on page 477*)

A completely assembled roof in place on the roof-assembly jig

Raising the Standards of

Locomotive Performance*

By F. H. Howard†

Good mechanical engineering, ideas from other industries and a study of motive power economics are ways suggested

THE principal function and foremost duty of every railroad man of responsibility is a constant effort to improve the ratio of expenses to revenues. His effort may be directed either towards augmenting the traffic income or reducing the operating expense, or the indirect attainment of either end simply by promoting efficiency in his particular department.

The mechanical department officer has no control over the decreasing traffic trend, except by insuring the most reliable performance to keep the railways' service dependable and therefore attractive, and controls only those expenses represented by inflated material and labor charges, a certain irreducible portion of which is incurred moving the traffic his company enjoys. If he is mindful that he and his colleagues are responsible for the disbursement of about fifteen cents out of every dollar's receipt, he will attempt most steadfastly to lower these expenditures to combat the raised charges set by non-mechanical authorities, and thus keep the variable portion at a level to react favorably on the operating ratio.

There is no single one of the locomotive department's efforts which can be held most important to railroad prosperity, because all companies are distinguished by variations in traffic density and composition, terrain and climatic handicaps, trackage standards, fuel availability and financial expediency, and these characteristics are reflected in their respective mechanical policies. The department can offer nothing of greater value than what may be described as alert, informed, and intelligent railway mechanical engineering, enhanced by continual research, not necessarily confined to the drafting room or backshop, but practiced mentally by all whose responsibility lies in designing, building, or maintaining motive power. Broad vision and preparedness to experiment with sound processes and designs will mark the locomotive department striving to strengthen its railroad's position.

Borrowing Ideas From Other Industries

It might be asked whether methods and materials could not be borrowed from other industries. Certain practices, ideas and designs representing the best railroad policy of the past are open to scrutiny in the light of the accelerated development pace set by wartime urgency. It must be admitted that industrial genius met the demands of military genius and modern rail demands are no less urgent. While a practical peacetime restraint should be applied to unlimited flights of engineering fancy, the railroads should have the same will to explore with an insistence on complete reliability.

Acceptance of the Diesel locomotive, to the production of which a good deal has been contributed by automotive interests, must pose the compelling question of what further ideas can be adopted from the industry where cost-cutting engineering is an art. For instance, its work towards the perfection of armored fighting vehicles operating under the most adverse conditions resulted in new conceptions of metallurgy, lubrication, vibration and general machine design, some of which are undoubtedly ready for further exploitation.

Boiler Maintenance

The welded fabrication of boilers appears successful, although no welded boiler has been in service long enough to fulfill all the promises made for the process. The motive power officers of the pioneering railroads deserve credit for their attitude in giving welding this comprehensive trial on the most costly single item of steam locomotive maintenance. It is very likely that more excursions into the welding field will uncover repair and construction situations where it can be employed with profit and locomotive men therefore should be acquainted with welding and train their forces in the appreciation of its suitability as well as the necessity of using the correct welding procedure, without which welding becomes futile.

The view has been advanced that the replacement of boilers on locomotives requiring boiler repairs would effect economies, because the power could be restored to the line many days earlier. A pool of repaired boilers would be maintained for each principal class of engine, and as soon as an unserviceable boiler was removed, it would be replaced by a serviceable one. The retention of a locomotive after completion of other work solely for a succession of boiler repairs would be avoided, as they would be made quite independently, and the repaired boiler added to the pool. This procedure is followed by British railways with their large fleets of standardized power and it deserves investigation to determine whether large American boilers, with their multitude of fittings and attachments are suitable for handling in this manner, and if so, whether the outlay for the creation of such a pool would be justified. At the same time, formation of a pool with welded boilers would present a fine opportunity for comparison of welding to riveting.

Coupled with the will to accept new methods and materials, must be the conviction that any old ones proven unreliable, uneconomical, or just useless, are to be discarded. Forward thinking mechanical department officers cannot afford to tolerate slipshod engineering of railroad origin any more than they can afford to refuse the admission of outside ideas. If every mechanical practice of doubtful soundness were examined as follows, "Does it reduce expenses directly or indirectly or does it improve the operation of this railroad?" and if all failing to answer in the positive were ruthlessly cast aside, the man asking the question can be sure he is getting the most constructive contribution towards efficiency. Clear precise investigation and adequate time for appraisal, balancing hidden costs of administration or maintenance against apparent

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* Paper submitted in the competition on how to step up mechanical department effectiveness announced in the February, 1947, *Railway Mechanical Engineer*. The prize winners were announced in the June issue.

† Member of mechanical department staff, Canadian Pacific.

savings, will result in only such decisions being made as will ensure a progressive mechanical policy.

Economics of Motive Power Types

Whether Diesel power is employed, and to what extent, are decisions generally out of the hands of most mechanical department officers, but an appreciation of its design and economics by all concerned with its operation should dispel any doubts and fears which might prejudice its acceptance. The greater initial cost of a Diesel locomotive results in increased interest and depreciation charges, and it should be obvious that maximum yearly mileage is required in order to reduce these charges to ton-mile equality with those of a steam locomotive, so they cannot combine with certain apparently higher maintenance costs to tip the scales the wrong way. Fortunately, maximum mileage is attainable due to inherently high availability; this fact must be appreciated and advantage taken of it. There has been noted, however, a warning of the approach of a saturation point in Diesel employment, and railway executives will be anticipating advice on this situation. It is to be hoped that figures can be made available to them, specifying the yearly mileages for their different types of existing power, above which it will be economical to substitute Diesels, and below which the present engines remain superior. This is not to say that modern steam locomotives are to be excluded, but concrete claims to support their inclusion must be put forward, and these have not lately been in great evidence. At any rate, the alert railway mechanical man will pay close attention to the economics of the question, and will keep himself posted on them, so by the use of intelligent engineering, he will be best equipped to influence the decisions of the senior management. Opinions formed from narrow experience, false admiration, or partly absorbed knowledge have no place in any industry and especially the railway industry where there is often such a narrow margin of profit, or none at all.

The very new forms of motive power, consisting mostly of various types of turbines, must be accepted in the same spirit in which they have been designed and sent out. Railway operators who have authorized large expenditures on experimental units have the right to expect that these units shall be given trials as thorough as they are prolonged. Only when they are in the hands of mechanical forces determined to operate and maintain them as required will these trials provide figures that permit conclusions to be formed.

As long as the majority of the motive power inventory consists of reciprocating steam locomotives, and it will for many years notwithstanding its diminishing share of the mileage, supervisory officials must be animated by the enormous investment steam locomotives, represent, and exert even greater efforts towards understanding how their upkeep influences the net earnings. The magnificent performance of locomotive maintenance forces during the war showed how well fitted they were for assuming the increased commitment of keeping all this machinery in satisfactory order without disruption. The call in these more orderly times is for greater excellence, and one step is for enginehouse and shop leaders to insist on the full and correct employment of their locomotives. Simple as a steam locomotive is, it can become a complicated affair in the hands of those who will not familiaize themselves with its principles. The formation of fully descriptive and sensible opinions on devices under test and the preparation of prompt reports of chronic defects with accurate conclusions thereon are two minor habits to be developed which are of great assistance in the continuous battle for trouble-free and lower cost transportation.

Machine Tools

(*Continued from page 455*)

modern car-journal-bearing boring and broaching equipment which performs these operations at very low cost and is therefore worthy of serious consideration.

The use of electric welding machines in the maintenance of rolling stock has increased tremendously and the manufacturers of this type of equipment are now producing compact portable welding machines of 400-ampere capacity or greater at very nominal costs. The small one-man machine or the large multi-opeartor equipment should be replaced.

During the period of the last World War, it was difficult to obtain new machine tools and many of the tools used for the repairing of railroad rolling stock were used on a two- and three-trick basis, six and seven days a week, and now require complete overhauling. Furthermore, a nation survey of railroad machine-tool equipment would indicate that the average age of these machine tools is over 35 years. Railroad management, therefore, recognize that on account of the obsolescence and condition of tools, coupled with the ever changing picture as to the design of rolling stock, new tools should be provided and these new tools, if carefully selected, should pay for themselves in three or four years.

Machine tool builders, in designing machines for railroad shops, should recognize the fact that when new machines are installed, they will be in service for 20 or more years and the design, therefore, should involve anti-friction bearings of generous proportions throughout, hardened-steel ground gears, hardened wearing surfaces, generous bed and spindle design. They should try to provide central lubricating systems to all parts and simplify the controls within easy reach of the operator. The machine should be so designed that a motor with 25 per cent additional horsepower could be applied where necessary. As indicated earlier in this article, there is a lack of skilled mechanics, and with this in mind, machine tools of the future should be designed with the necessary hydraulic or electronic controls so that the machine operator is required only to apply and remove the piece. Templates or blueprints made on plastic or photographic plates will eventually be provided which will permit the electric eye to follow the drawing and reproduce the finished product. It is desired to again stress the fact that modern machine-tool equipment should be provided with protective equipment to indicate whether or not the cutting tool is properly ground and removing material effectively.

Various new types of equipment being applied to rolling stock should open up the field of induction heating, deep freezing, Magnafluxing, X-raying and use of radar in the maintenance and operation of modern railway rolling stock.

In the previous paragraphs, an effort has been made to indicate that there is a definite need for new machine tools on the various railroads and only a few of the tools that would show definite economy have been indicated. There are many other tools, such as planers, shapers, saws, threading machines and shears, that are in the same category. Obsolete air tools should be replaced with modern air tools and impact wrenches.

NEW DIESEL SHOP IN MEXICO.—The construction of a special workshop in San Luis Potosi for the repair and maintenance of Diesel-electric locomotives is planned by the National Railways of Mexico, according to a recent issue of Foreign Commerce Weekly, a publication of the United States Department of Commerce. The project is scheduled for completion before the end of 1947 and will represent an investment of about 1,000,000 pesos, 700,000 pesos for the shop and 300,000 pesos for equipment.

Short Cuts in

Work on Repair Tracks*

THE car departments of some railroads have given thought to easing the tasks of car repairmen by providing mechanical means of performing the heavier duties, such as carting wheels, truck bolsters, handling side frames, car doors and other heavy parts. Tonight it is our intention to show in motion pictures certain of these methods that are now employed for making heavy tasks lighter and at the same time increasing production.

The chief underlying motive in presenting the film is to stimulate interest and discussion along the lines of further mechanizing repair track operation in connection with car repairing that will increase efficiency, decrease costs; conserve manpower; and above all, make car repairing a more attractive occupation that will inspire pride of accomplishment through power harnessed by man's ingenuity.

Some of the mechanical devices to be shown are shop-made and can be produced by any competent blacksmith. Others are specialty items purchased from the manufacturers. With the increased cost of labor, it is fundamentally good business to study the labor costs of various operations as they are now performed and give consideration to the type of equipment that will best do the job in less time, thus increasing production as well as reducing cost. In this connection you can readily understand that if the heavier tasks in the car department are performed by mechanical means, the car repairmen will be in better physical condition to maintain full production during the late afternoon working hours than would otherwise be the case.

A motion picture was then shown illustrating the following subjects: Spot system of car inspection and journal box oiling on hump approach tracks; air hose coupling irons; miscellaneous items anyone can make; lift trucks handling car repair material; also a special operation built around the use of a lift truck wheel; wheel-car designed for shipment of wheels in large quantities, having a capacity of 46 pairs of mounted wheels; jacking cars with air-operated power jacks; hanging car doors; spot system of changing defective wheels; and servicing AB piston assemblies.

The first illustration of a two-way hump operation shows two trains being switched in opposite directions at the same time. The overhead structure is the general yardmaster's office located on the apex of the hump. This building is equipped with a loud speaker system for communication with all car retarder operators as well as switch crews in both classification yards.

The movie showed two designated points used for non-interchange car inspection, each located on the approach tracks about 300 ft. down from the apex of the hump. Flood lights, used for night-time inspection, are an adjustable type, 200-watt capacity, with 12-in. diameter lenses and are very satisfactory for their intended purpose.

How air-hose coupling irons are used

Cars move by this point at the rate of about four a minute, which allows ample time for required inspection of wheels, brake rigging, safety appliances, shifted load, etc.

Records taken of this inspection are confined to the train number, time inspection is started and completed, initial and number of first and last car of each train, and record of cars shopped for repairs.

The train shown consisted of 78 cars and was inspected in 20 min. With constant movement by this point it is possible for two men to inspect 240 cars an hour, but the average operation is slightly over 100 cars an hour and the cost of inspection averages .0240 per car.

The second illustration shows a classification and train departure yard where iron hooks are used for coupling air hose. These coupling irons are made from 3/8-in. spring steel. The left-hand iron is 44 in. long. The right-hand iron 41 in. long has a double offset hook, whereas, the other iron has only a plain hook.

The moving picture gave a close-up slow-action view of an actual air hose coupling operation with the carman standing on the opposite side of the track. It illustrated how the double-offset hook performs the major part of

* Excerpts from a committee report presented at the May 12 meeting of the Car Foremen's Association of Chicago.

Panorama of modern two-way hump operation

Oxy-acetylene cart equipped with pneumatic tires

the coupling operation, and the left hand iron with the plain hook is used merely to pull the opposite hose over to make the connection which leaves the feet and legs always outside of cars and body from hips up is bent forward between the cars only momentarily, while attaching the left-hand hook to the air hose on the far side of the tracks.

The primary purpose of these irons is to eliminate or reduce personal injuries, and this has been accomplished to a very appreciable extent on the various railroads where the device has been used more or less extensively during the past several years.

As cars move over the apex of the hump, journal boxes serviced by car inspectors who leave the box lids open in receiving yard, are given free oil by means of a nozzle inserted in each box, oil being stored in a large tank under 40 lb. air pressure, which is heated in the winter, and by this method saves the men from walking through the yard, going to and from oil supplies, which would require at least 30 per cent of their time.

Also illustrated is an oxy-acetylene cart made of scrap material with an angle iron forming the base of the cart, equipped with pneumatic tires, for easy handling and subsequent prevention of damage to gages and other equipment.

The fourth illustration shows an ordinary farm tractor, equipped with a hydraulic boom attachment for applying and removing box car doors. The boom has a special chain arrangement that hooks into the door handle at the bottom, and clamps on the other side of the door, partially balancing the car door and requiring only four men, including the tractor operator to handle a car door. When manually done, this operation normally requires 11 men and presents the possibility of smashed fingers, bruised legs, feet, etc.

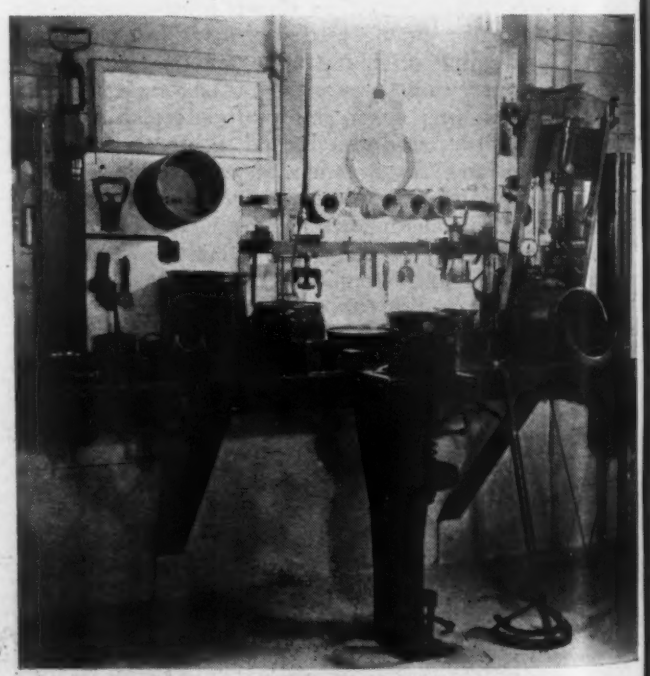
The next three illustrations show an AB brake piston dismantling apparatus, patented by J. R. Lindroth, general foreman, Chicago, Burlington & Quincy, Galesburg, Ill., and well adapted to save time and labor in cleaning pistons. This device is constructed with an air jack at the bottom, having sufficient lift, and is operated by low air pressure.

The jaws holding non-pressure head and piston in place are fastened to a plate which turns on a pivot, the plate being held in position by a spring catch at the top.

When the piston is in position, it is perfectly balanced and can be turned by releasing a spring catch at the top. The piston is held rigid with either non-pressure head or piston in up-position. The piston is raised about 1 in. which is sufficient to permit the removal of piston hollow rod collar, after which air is released and the piston is dismantled, which requires approximately 30 seconds.

Another view shows the piston in the up-position with the AB brake piston packing-cup-removing device in place. This device removes the lubricator and packing

Tractor equipped with hydraulic boom for applying box-car doors



AB air brake piston dismantling and assembling equipment

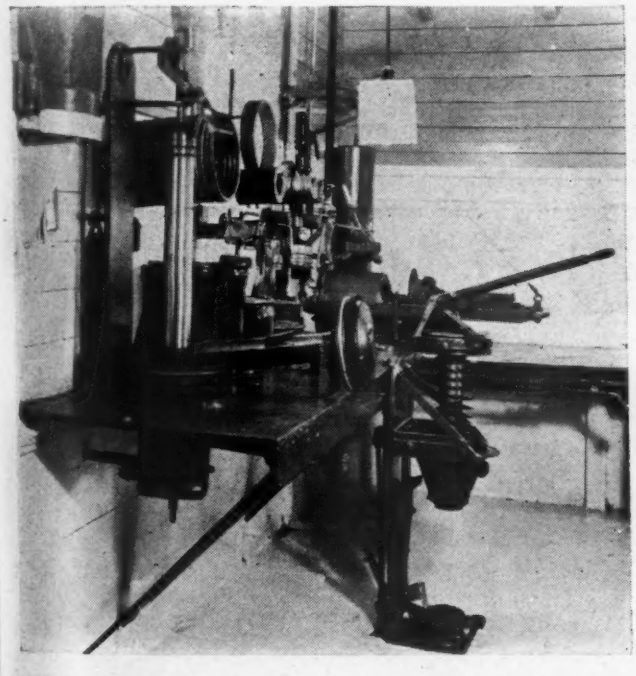
cup in one operation, without damaging the packing cup, lubricator or piston head. It also shows a piston in the holder on top of the bench where grease is removed from the packing cup. One piston is also shown in the polishing device, where it is highly polished.

The last illustration shows how the piston is dismantled. In order to assemble the piston and non-pressure head again, a guide is placed in the end of the hollow rod and as soon as air is turned in the jack, the assembly is completed.

How the AB Brake Pistons Are Cleaned

The operator places a special handle in the piston hollow rod and lifts the piston from the handling container and places it in the holding jaws of the dismantling apparatus. He then turns the low pressure air in the jack located at bottom of the device which raises the piston rod up through the non-pressure head sufficiently to permit removal of the hollow rod collar, using a special tool, as in many cases the collar is rusted hard on the rod. When done, the operator releases the air from the jack and now the piston and hollow rod are completely disengaged from the non-pressure head. The operator then removes the seal ring retaining plate, hollow rod seal rings, swab retainer, swab compression ring and hollow rod lubricator swab.

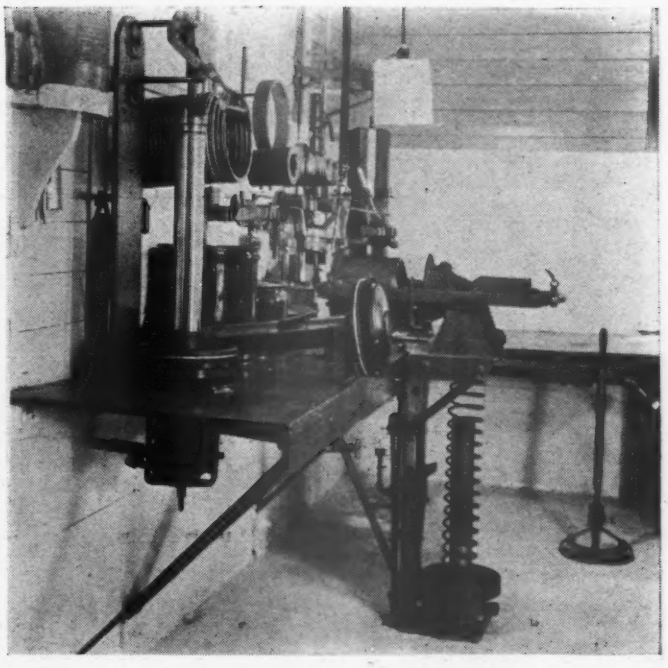
The release spring is then removed and cleaned. The non-pressure head is removed from the holding jaws



AB piston in up-position with packing cup removing device in place

and turned upside down. The strainer retaining ring is removed; strainer removed and placed in the cleaning solution. The non-pressure head is cleaned. The clean strainer is put in and retainer ring is put back. The non-pressure head is now turned over and placed back in the holding jaws. The piston is removed from the jack and placed in a special holder on top of the bench and grease is removed from the packing cup by using two special tools. When done, the piston is placed in another device where the hollow rod is polished. (Average total time, placing piston in device, polishing rod and removing piston is 45 seconds.) The rod is covered with grease while still rotating in the device. This device is operated by a small air motor and rotates at a top speed of 200 r.p.m.

The operator now places the piston back on the jack. The guide is put in the end of the hollow rod. The release spring is put back on piston, air turned in jack, piston moved up and engaged in the non-pressure head.



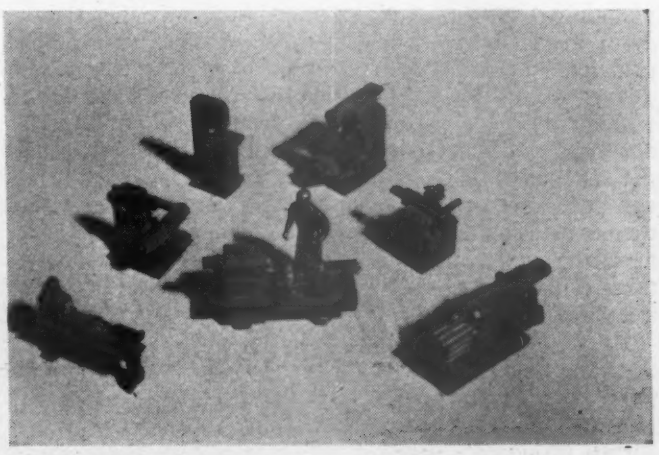
How the AB piston is dismantled

A new hollow rod lubricator swab and compression ring are applied. The swab retainer is put back. Standard air brake grease is then put in, using a special grease gun, after which the seal rings are put back and seal ring retaining plate and last the collar is put back on the rod. The spring catch at the top of the device is now released, the device turned on the pivot and the piston is now reversed with the packing cup up.

The operator now uses a special tool by means of which the packing cup and lubricator are removed in one operation without any damage to packing cup, lubricator or piston head. The lubricator is cleaned or renewed when needed; packing cup is cleaned and inspected and renewed when needed; piston cleaned, put in cylinder and given packing cup test. The piston is now placed in a handling container. The non-pressure head is painted and the piston is completed ready for use.

The total average time for the operation floor to floor is 15 min. From a Safety First standpoint, these devices have demonstrated notable value.

* * *



Scale models made by the Triometric Engineering Co., 1188 Wolfendale St., Pittsburgh 12, Pa., present a three-dimensional preview of a proposed shop layout

N. Y. C. & St. L. locomotive shop at Frankfurt, Ind.

Engineering A Railroad Shop

By K. L. Urich

Assistant supervisor, tools and machinery,

New York Central System

Most railroad shops, much like Topsy, "just growed" over the years and now the roads, faced with high labor costs, must make an engineering study for the future

PRELIMINARY to discussing details of shop planning, it might be well to consider the outstanding features of the well-planned shop. On first entering a department or shop, it will usually be evident whether or not the shop has been well-planned. The trained observer can almost tell at a glance how much effort has been put into the planning of the shop and can quickly measure the effciency of the department by a first impression. One of the principal things to look for would be wide, well-marked delivery aisles, entirely free of raw or finished material without any appearance of congestion. Secondly, the observer will be able to tell at a glance whether or not the machinery is arranged in an orderly manner. He will note whether there is sufficient room for the material to move into the machines and out again without unnecessary confusion. He will quickly appraise the conditions of light, heat and ventilation as well as the general cleanliness of the department.

By way of contrast, the poorly planned shop will disclose the following: Narrow material lanes, usually cluttered up with miscellaneous material, a haphazard arrangement of machinery, raw and finished material strewn promiscuously over the department. Conditions such as above are usually complemented by inefficient material-handling systems and poor conditions of light and ventilation, all adding up to undesirable working conditions. Workmen can not and will not do their best work under conditions of this kind.

When shop layout is spoken of, it brings to mind that a certain number of essential machines and equipment are to be placed in a shop or department in the correct relative position. Generally speaking, this is what is to be accomplished but the means of doing it requires thorough and careful study. The experienced engineer will have little difficulty in meeting each new situation. However, it requires continual observation on his part to keep abreast of changes, that is, machine-tool requirements change continually with new machines, space requirements are continually changing due to design changes on locomotives and appurtenances, and he will readily admit that a layout can not be planned merely by picking up a machine here and placing it in another location. The requirements of each individual machine and each individual operator must be studied carefully from many angles before any actual movement of machinery is begun. The ultimate object of the planning will be to set each individual machine in such a manner that it will blend into the work flow of the department and, likewise, of the shop.

In the case of attempting to revise existing plant layouts, the first and principal obstacle which the engineer will meet will be an overcrowded condition, that is, too

many machines and not enough space properly to place them. This is a condition prevalent in most shops and in particular in almost every major railroad forge and machine shop. It seems that work in these two departments of the shop has increased in greater proportion than work in other departments. Therefore, in discussing shop layout, these two shops will be given prominent mention. In recognizing the principal obstacle to be overcome, if plant layout is to be improved, it might be well to review briefly some of the causes responsible.

Smaller and older shops have been closed with their work superimposed on modern and better-located larger shops. New work has been added due to the increase in the number of appurtenances which have been added to steam locomotives, such as feedwater heaters, boosters, stokers, train-control apparatus, etc., all requiring additional floor and work space for repair and testing. New processes have been added, such as Magnafluxing, X-ray inspection, additional heat treating facilities and also a good many parts are now being repaired by the welding process, while others are fabricated by welding, requiring special work positioners and other facilities.

The adaptation of roller bearings to cars and locomotives has made excessive demands on non-existent floor space. These changes have been so gradual over a period of years that local supervisors tend, in some cases, to overlook the work flow.

Preliminary to attempting to make a shop layout or improve on a present layout, it is necessary to list operations which occur in sequence. With these operations clearly in mind, the engineer is in a position to place machine tools in correct relative position. However, if a study is to be made in a department where a great many different items are manufactured, it is often advantageous to make a flow chart as follows:

1—Make a scale showing the outline of the building or, if builder's drawing is available, blank out the interior portions of the print, leaving the bare outline.

2—Take over-all measurements of machines, that is, projected floor area which these machines occupy, and place them in relative positions which they now occupy in the floor plan.

3—Next, take map tacks placing a tack at each machine and with string or floss, trace the material through the department from the raw-material stage to the finished product. In cases where several different items are going through the same department, it is helpful to use string or floss in a variation of color, each color representing a different item. When this is completed, a clear and graphic picture of what is taking place in the department, will be in evidence. It will be seen at a glance the exact route which the material flows and with this information at hand, the engineer is in a position to take the first steps in making a comprehensive layout. In making an analysis of this kind, it will often be found that work progresses back and forth across the complete length of the shop several times before it is finally finished and delivered to the stores department.

From this study, it is expected that processes and machines which show up considerably out of the production line can be spotted and changes recommended which should expedite the movement of work through the shop by eliminating back tracking and unnecessary handling. It may be found in some cases that material goes from the iron yard to the center of the shop where shears may be located and back to a battery of forging machines at another location in the shop, from which point it may move to a drill press location at the forward end of the shop and then move across the shop to the heat-treating department. In a case of this kind, it will be advisable

C. B. & Q. Diesel-electric shop

to consider the relocation of the shears so that the work could be lined up progressively and flow from the raw-material stage to the finished product without unnecessary lost motion.

If a comprehensive study of the forge shop is made, no doubt many cases of this kind will be found and multiplying this effort several times on several items, it will soon be found that work moves in and out of the shop much quicker and production can be stepped up all along the line.

In pursuing a study of this kind, the engineer should pay particular attention to material handling along the line. He should make careful note of any material that is thrown on the floor between operations as, in general, material in a modern shop should never touch the floor. This means that labor will have to be expended to pick it up and place it in containers prior to movement to the next operation. Before making final changes on the basis of such a study, the engineer should be certain that, in setting up a proper work flow for several key items, he does not throw some major items out of line. The probability is, however, that if basic machines are properly lined up for principal production items, the greatest possible savings will be realized. A study of this type very often will show which machines are seldom used for meeting production requirements and, therefore, might be considered for removal from the shop.

Making Room in the Crowded Shop

The causes of the overcrowded shop have been discussed briefly above and as this condition is prevalent in most shops, the following suggestions are made with a view of overcoming this condition. In starting the survey, it is a good plan to break down the shop organization into departments. A detailed analysis of the work flow will show up unused machines and facilities. In a major forge shop, for instance, it is likely that a forging machine, several furnaces, several hand forges and possibly a steam hammer can be found which are seldom if ever used, being held mainly for standby protection. It may also be found that the forge shop is being used for a sub-store house and that an excessive amount of billets and bar stock is being stored here. The excessive raw material should be returned to the store house where it properly belongs and the unused machines and facilities removed entirely from the shop. As welding operations have increased considerably over a period of years, excessive material and equipment will be found in and around welding locations. Welding machines may be occupying valuable floor space, when they can, if necessary, be supported on building columns above the floor level. In some shops, it may be that the forge shop proper is used for die storage and for storing templates used on the oxygraph machine. If this situation exists, it is recommended that a separate building be considered for this purpose. In a like manner many other space-saving ideas can be developed, depending upon the ingenuity and imagination of the engineer.

In the machine shop it will likely be found that there are several miscellaneous machines which, owing to their age, condition and obsolescence are no longer used continually and a further investigation will no doubt develop that these machines are only being held for standby production. Consequently, they can be removed from the shop without any decrease in production capacity. In surveying various departments, it will often come to the attention of the engineer that sometimes one man is using several work benches. These take up considerable floor space and it will often be found that smaller and better designed benches, will supplant the larger work benches. This is an important factor and should not be overlooked in any departmental layout. The new benches can be designed specifically for the job and can be made to contain the workmen's tools and add considerably to the efficiency of the man and at the same time to the general appearance of the department. Uniformity of benches can be accomplished in a more orderly arrangement than provided.

Making A Shop Layout

After the unused facilities are removed from the various department, the plant engineer is now in position to proceed with the layout. Preliminary to making the layout, the engineer should provide a print with the building outline thereon similar to the one used for the work flow study. A suggested size for this sheet would be approximately 18 in. by 24 in. and the suggested scale of the outline drawing would be ⅛ in. to 12 in. A sheet of this size can be placed on a standard drafting board which can be easily carried around the shop. From the work-flow study, the engineer knows what machines are to be used. He also knows the process to be developed and the order in which the work flows from one machine to another. With this in mind, he can now cut out templates, using the same scale as above, representing the respective machines. These cutouts should be representative of the projected floor area occupied by the machines and should not be confused with foundation plans of the manufacturer. Fig. 1 shows a group of machines typical of a shop layout. The vertical boring mills, lathe, grinder, etc. are represented by line drawings and show projected floor areas. This layout also shows

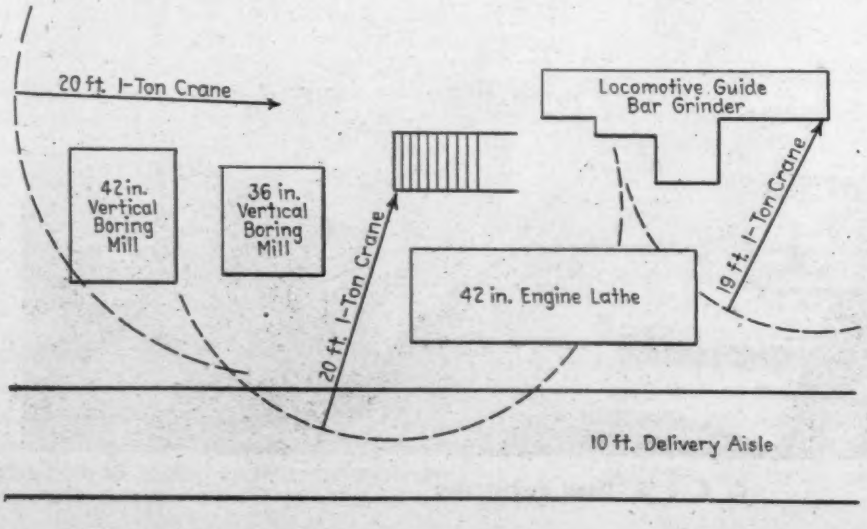

20 ft. 1-Ton Crane
42 in. Vertical Boring Mill
36 in. Vertical Boring Mill
Locomotive Guide Bar Grinder
19 ft. 1-Ton Crane
20 ft. 1-Ton Crane
42 in. Engine Lathe
10 ft. Delivery Aisle

Fig. 1—A typical shop layout of a machine group shown as projected areas

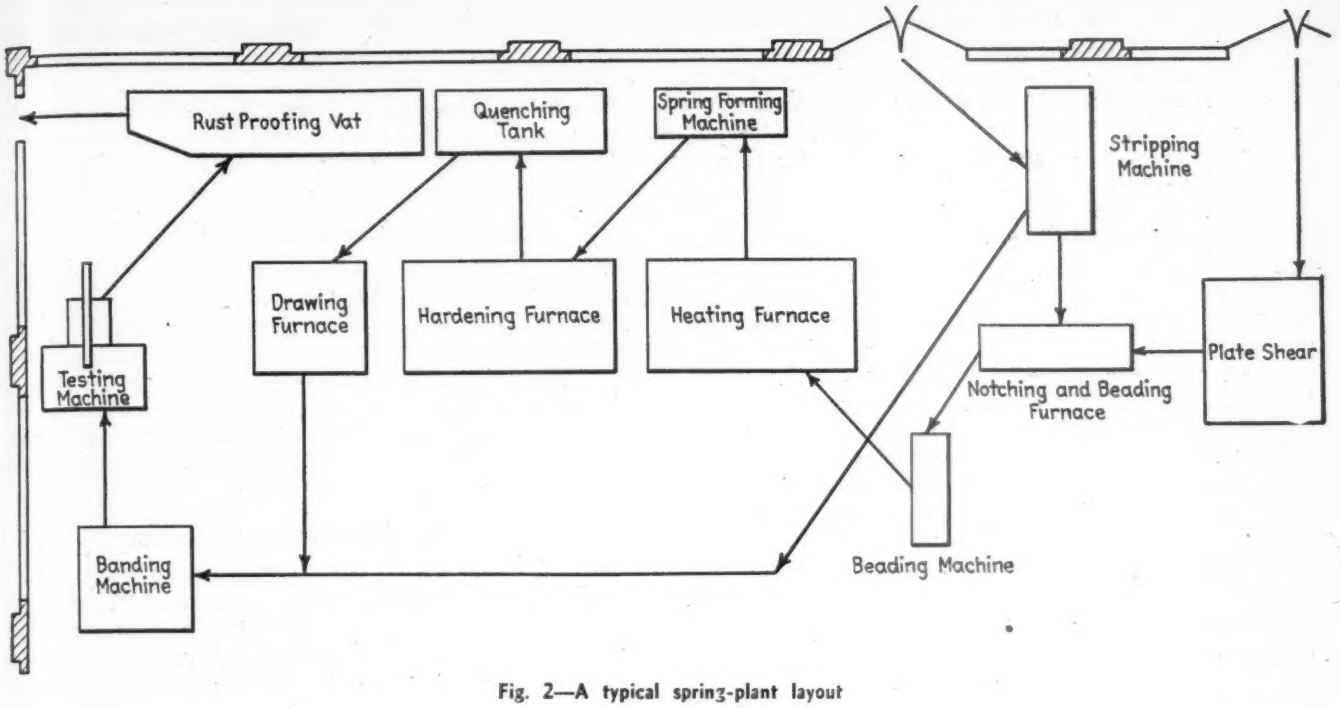


Fig. 2—A typical spring-plant layout

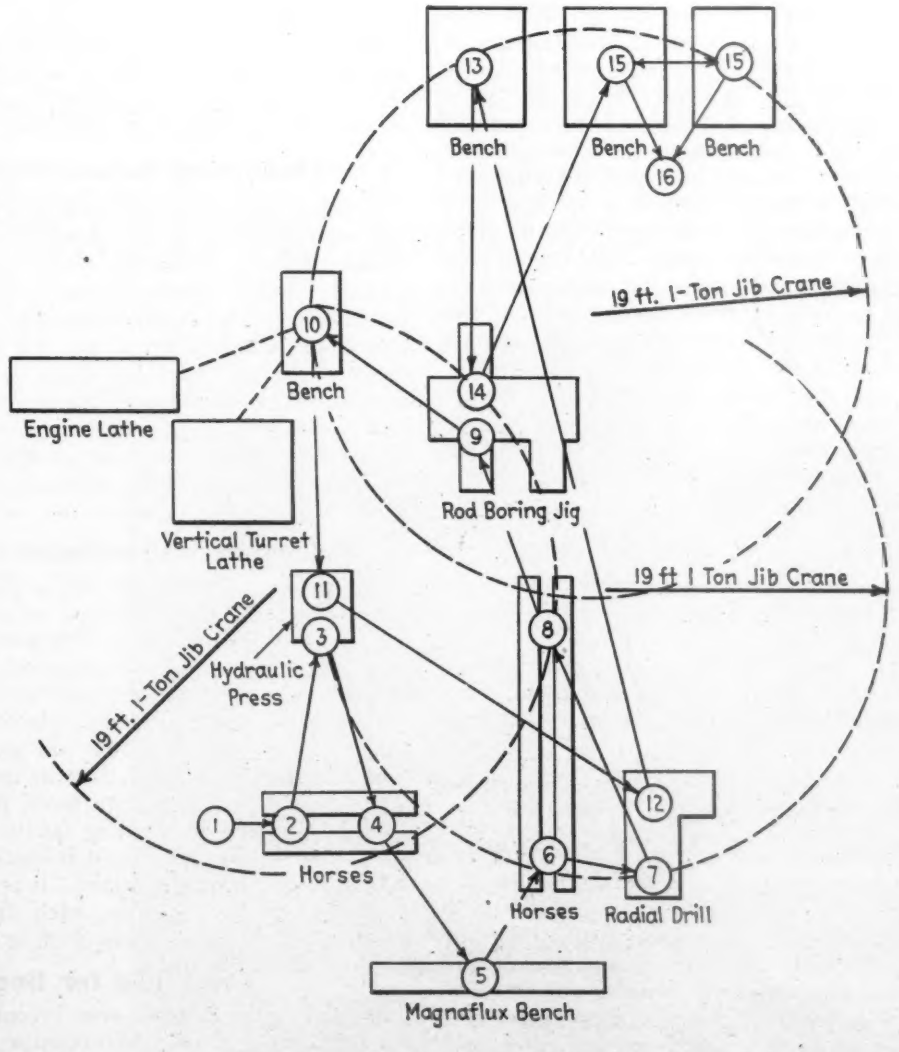


Fig. 3—Layout of a typical motion-work department

the swing of jib cranes covering these various machines. In cases of departments under consideration where facilities are installed on expensive and elaborate foundations, it is advisable to work around these machines as much as possible. This can usually be done, but in some cases where this does not seem feasible, the machine must be moved to throw it into the correct position in the production line. This feature is entirely dependent upon the judgment of the engineer and a little experience will enable him to come to such decisions quickly. Making full use of the work study and other information obtained, the templates should be arranged on the layout in such a manner that a progressive operation can be realized. The requirements of each individual machine and operation should be studied with a view of providing sufficient floor space at each location.

In making a study of this type, it is a good idea to take the layout down to the department involved in order better to visualize the various movements involved. Templates should be arranged on the layout in a number of combinations until the one best suited to the work requirement is obtained. The ultimate results of the layout will depend entirely on the effort put into the project by the engineer and upon the advice which he may receive from the foreman on the job and the men operating the various machines. This factor is an important one and should not be overlooked. Often the man who is performing the operation may give many helpful suggestions and by consulting the foremen and workmen, they will feel that they are part of the plan and will help to make it work, once the changes are made.

For purposes of illustration, the spring plant of a typical locomotive shop might be considered, as this is one of the many departments of the shop which can be set up for receiving straight-line production. In a spring plant, which is properly laid out, work will enter one end of the department and flow continually in a straight line through the department without confusion. Springs requiring repairs will be accumulated in a storage yard outside the shop immediately adjacent to the spring plant proper and springs requiring repairs are brought in through an access door convenient to the spring stripper. After the spring is stripped it is passed over to the assembly position and at the same time new spring stock will parallel the flow of the old spring leaves with new leaves sheared from bar stock notched, formed and beaded, and will then go to the hardening furnace, and, after processing in this position, will go to the drawing furnace. When removed from this furnace the leaves are ready for the assembly table. After all parts of the spring have been accumulated on the assembly table, the whole spring is advanced to the spring-banding machine. After banding, the spring goes to the testing machine, from there to the rust-proofing vat, then out of the shop and to spring storage.

The motion-work department offers an opportunity of achieving straight-line production by arrangement of the various machines and assembly benches involved. This is illustrated in Fig. 3.

Departments Which Must Be Separated

Many other departments are somewhat more difficult, for instance, the tin and pipe shop. The facilities in this shop, for the purpose of expediting work, may have to be divided, that is, in the case of a shop using the spot system of making locomotive repairs, it might be advantageous to locate the pipe threading, bending and forming machines properly belonging in the pipe shop, in a space adjacent to the erecting pit where pipe is put on the locomotive. This saves many steps in piping up an engine to schedule. This phase of locomotive repair is most important as it may be the determining factor in getting an engine out on time.

It may be advisable to concentrate welding operations at one point for the purposes of better supervision to take full advantage of any central shop ventilating system which may be had at only one location in the shop.

Taking the Machine to the Job

In certain instances, it is advisable to take the machine to the job. For example, the turret lathe on which frame and miscellaneous fitted bolts are made should be divorced from a machine section proper and located convenient to the erecting floor where frames are worked. This is a good time saver and should be taken advantage of wherever applicable. In general in cases of this kind, taking the machine to the job eliminates material handling and saves many steps.

Taking Material to the Job

In a locomotive back shop there are many locations where it is advisable to make provision for material wagons on which is stored material sufficient for use of the department for a period of one day, it being the recommended practice to return these material wagons to the stores department at the close of each day for replenishing. Although this may be a stores department matter, in making any layout, particularly in a department such as the air-pump repair department, booster, stoker, etc., it is a good plan for the layout man to provide sufficient space to locate such equipment. This is a very good time saver and has been found to save material as well. It should therefore not be overlooked in any layout where a number of small parts or pieces are required daily for the department and where a sub-storeroom is not immediately convenient to the location.

Abandoning Second Store Locations

Another important feature of shop layout which should not be overlooked is the question of balcony locations. Unless balcony or second floors are adequately served by fast, efficient elevators, they should be abandoned for production work wherever possible. This is particularly true of departments which are tied in directly with shop output. Roughly speaking it can be considered that production work performed on balcony or second floor locations is only 75 per cent efficient, because of the time involved in moving material on and off the balcony and the personal fatigue factor caused by workmen negotiating stairs or waiting on cranes and elevators.

Making Each Department Self-Sufficient

As far as possible, each department should be made self-sufficient. This is not easy to accomplish completely but it should be attempted. For instance, each operation in a department should be adequately served with cranes. A mechanic should not be forced to wait 15 or 20 minutes for a crane lift when needed. He should have a hoist of sufficient capacity to handle the work pieces which he uses. If the job requires that the mechanics in a certain department grind their own tools, then that department should have proper grinding facilities. Drinking water should be close at hand as it is costly to have men walk 100 ft. to a drinking fountain. It is not always practical to have toilet facilities for each department, but it is practical to provide urinals close to or adjacent thereto.

Check List for Engineer

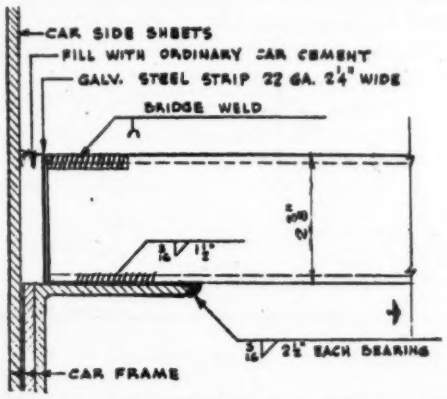
In making plans for a new layout in either a new or old shop, the following factors must be carefully checked

(*Continued on page 476*)

Lehigh Valley Installs

Nailable Steel Flooring

THE Lehigh Valley has begun a program of equipping 24 gondola cars with the Great Lakes Steel Corporation's Nailable Steel Flooring at the Sayre, Pa., shops. The channels, cold-formed from N-A-X high-tensile strip



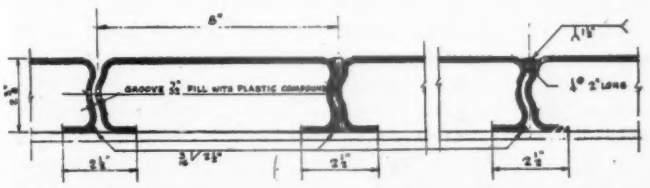
Section through the side sill—The ½-in. space between the side sheets and the galvanized strip placed over the channel ends was filled with car cement

steel, are of six-gauge material with a channel depth of 2⅜-in. The work was performed out-of-doors and no special facilities were required. The necessary equipment consisted of arc-welding apparatus and acetylene cutting torches.

The cars were part of a series of container cars decked with 2⅜-in. wood planking and with an underframe similar to that of a standard wood-floored gondola. The wood was supported at seven bearings. It was bolted to the side sills and to four rows of intermediate sills and rode free on wood fillers on the center sill. The car had low steel sides that could be lowered or removed to facilitate handling of the containers.

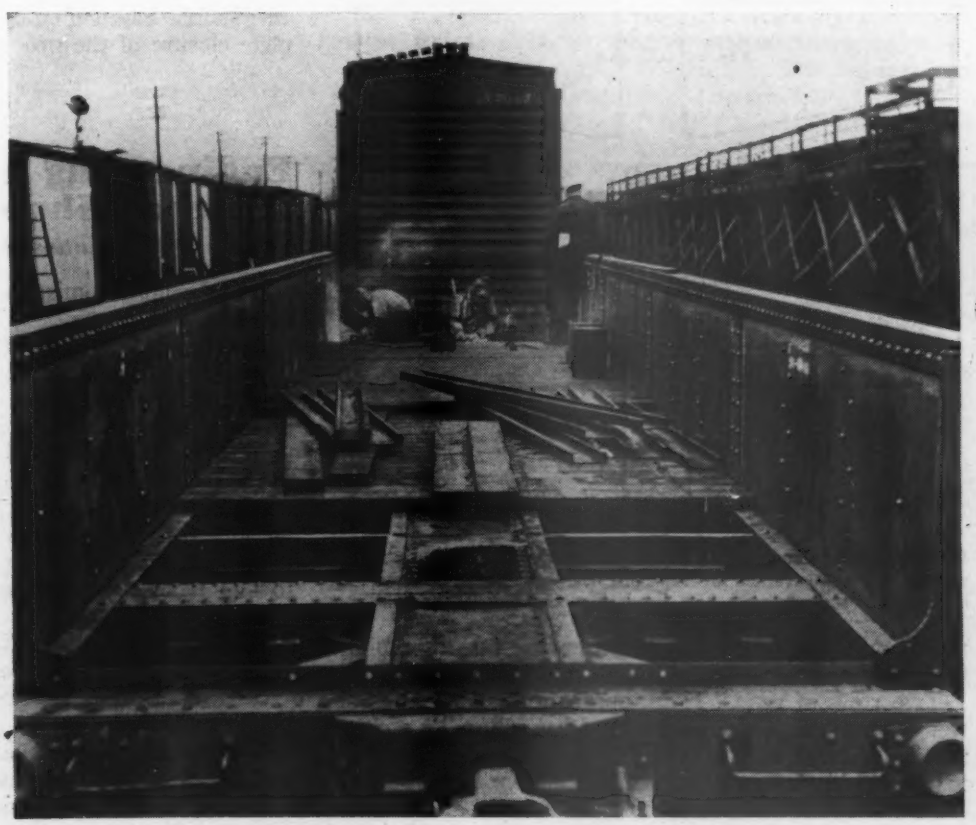
Before installing the nailable steel flooring the old drop sides, the wooden floor, and the four longitudinal zee's were removed. New fixed high steel sides were added and a row of new zee's was welded to the cross bearers on each side of the center sill as close to the sill as possible. The floor is now supported at four bearings as compared with seven bearings for the original floor. This is possible because of the higher structural strength of the channels.

The work of applying the flooring started in the middle of the car with the welding of both sides of the first channel to the top of each support, and proceeded in both directions toward the ends of the car. Each of the

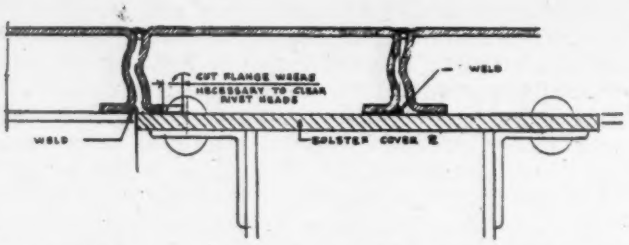


Detail of the installed channel—At the right gap between channels is shown a bridge weld while the center gap is shown filled with the plastic sealing compound

remaining channels, in turn, when aligned for the proper spacing of the nailing grooves by being set firmly against a 7/32-in. gauge, was welded on the free side to all supports. The bolster cover plate was in the same plane



The Nailable Steel Flooring channels were welded to all the supports along the free flange and to the longitudinal edges of the supports



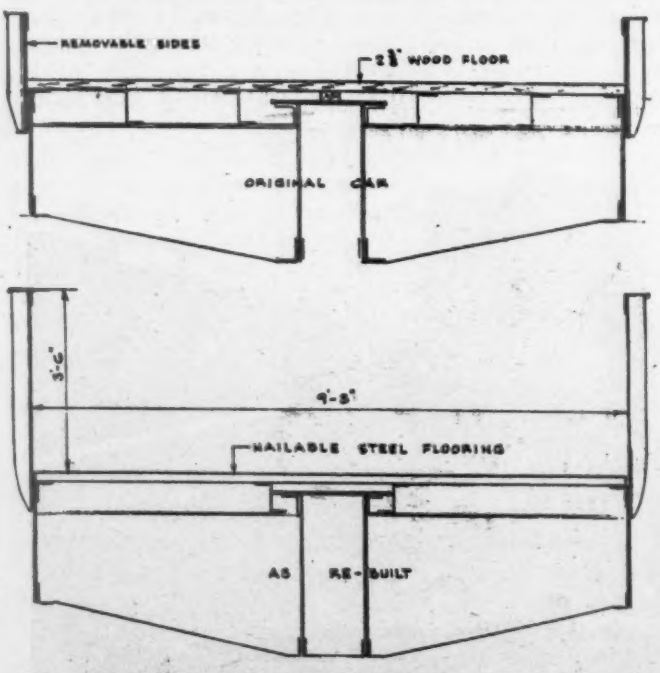
A strip of the channel flange was burned off to clear the rivet heads in the bolster cover plate

as the tops of the other floor supports, making it possible to weld the channels directly to the cover plate on their free sides.

When all channels had been welded along their sides to the tops of the supports, the workmen went underneath the car and welded the lower flanges to the longitudinal edges of the supports. The final welding operation was performed on the top of the car. Adjacent channels were "bridge-welded" to each other in place on the floor using a short piece of round stock placed in the U-groove between adjacent channels. Although the weld could be made without it, the use of the stock facilitates the bridge-welding operation, saving both welding rod and time. A line of 1½-in. bridge welds was made down the center of the car and along each side.

The bridge welding serves two purposes. It prevents local lateral elastic movement of the channels under the wedge action of the nails being driven into the nailing grooves, and it joins the entire floor into a continuous diaphragm of great strength and lateral stiffness.

The floor channels had a ½-in. clearance from the side sheets to clear rivet heads and splice plates, which space was filled with ordinary car cement. A thin galvanized sheet was inserted against the ends of the flooring chan-



Before installing the Nailable Steel Flooring the original cross-section of the car was modified by replacing the old drop sides and four intermediate supports with new fixed sides and two longitudinal zees

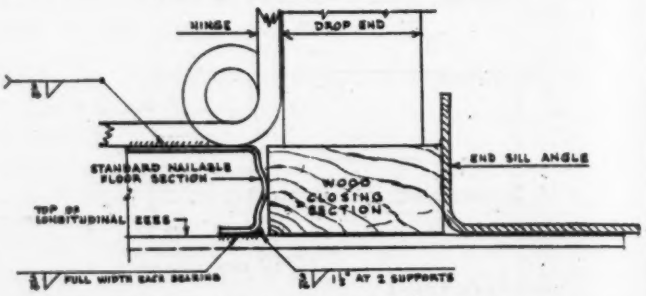
nels to prevent the cement from flowing into the hollow floor sections.

Two rows of rivets, 11 in. apart, occurred in the bolster cover plate. One row happened to fall under a channel flange, and it was necessary to burn off a narrow strip from his flange to miss the rivet heads.

At the bolster it was impossible to weld the channel flanges to the edges of the zee's and side sills. As a result the sides of the channels were welded to the top of the bolster cover plate, and additional bridge welding was employed to compensate for the omission of the flange welding. The additional bridge welding was spaced at intervals between the side sill and the longitudinal intermediate sill bridge welds in the three nailing grooves over each bolster.

The last two channels were connected by additional bridge welding at the approximate transverse location of the drop end hinges. The hinges were welded directly to the top surface of the last channel. The final closure under the drop end was made of wood although a special narrow steel section could have been provided.

The nailing grooves between channels were filled with



Detail showing the new drop end hinge welded to the end channel

a plastic material installed with a calking gun from both the top and the bottom of the floor. The plastic is a mixture of an asphaltic emulsion and pre-oxidized oils combined with asbestos fibre. The plastic, which tends to seal itself when nails are withdrawn, serves to fill the grooves for the transportation of fine bulk freight and to prevent foreign substances from fouling the nailing grooves. In the Lehigh Valley installation short lengths of the nailing groove were left without filler near the sides of the car for drainage purposes. These can be filled when the car is consigned for haulage of fine freight, although the type of bulk freight carried in gondola cars generally is too coarse to require complete closure of the grooves.

Engineering a Railroad Shop

(Continued from page 474)

to avoid common mistakes, after the final layout is approved:

1—See that each machine has sufficient floor space. There should be adequate room for the operator to work freely, a place for storage of raw material and a place for finished material. In estimating this space, it should be figured that the material, both raw and finished, will come to the machine in some sort of standard skid or tote box. It should be planned so that this can be accomplished without interference with other machines in the department, leaving easy access for the material to be carried to and from the machine by lift truck, crane or other means.

2—There should be sufficient lateral room for the longest bar stock without interference to the delivery aisles.

3—Proper crane facilities should be installed for individual machines.

4—The machines should be set so that the drive shafts and other parts can be removed for repair when necessary.

5—Sufficient space should be available for chips and

for their removal from machines without interference to the operator or other operators in the vicinity. (Note: Machines using carbide tools require greater chip space than the old machines using high-speed steel.)

6—Utilities required for machine operations should be anticipated and should be located underground in a correct position to serve the machine without causing stumbling hazards. All services such as electric power, steam, light, air and gas should be considered.

7—Machines should be located to utilize best natural light positions and should be adequately illuminated for proper utilization at night time or on dark days.

8—Floor drains should be installed where needed.

9—In the case of the existing shop, it is not always possible to plan for future expansion but in the case of laying out the new shop, care should be taken to make room for future expansion.

10—If possible, a locker or washroom with toilet facilities should be located at a central point convenient to the department. Somewhere in the vicinity of the department, lunch tables should be set up for use of the employees if a company cafeteria is not contemplated.

11—General lighting and adequate ventilation free from drafts should be provided for.

12—Properly designed work and assembly benches should be installed.

13—Drinking water should be available in convenient locations.

14—Important to the functions of the department is the office setup of the immediate supervisor. This office should be centrally located and of sufficient size, well ventilated and lighted and with adequate telephone facilities, as the work which this department turns out will be in direct proportion to the efficiency of the supervisory personnel.

15—Space permitting wide delivery aisles of at least 10 ft. in width should be used.

16—Finally, with all departments laid out for efficient operation, design a scheduling system which will absorb lost motion and insure a continual smooth flow of work from the separate departments which, when properly regulated, will result in more shop output.

Assembling Box Cars at Reading

(*Continued from page 464*)

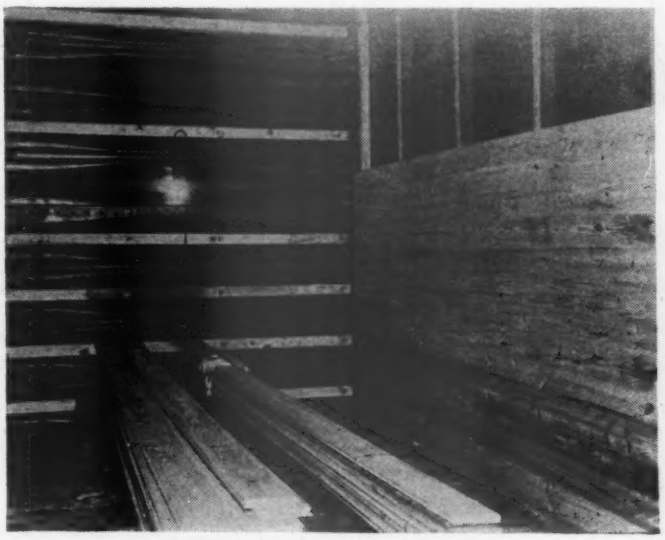
tion enables the riveter and his helper to remain seated while doing their work. The seats are each hung from four-wheel trucks which ride on the bottom flange of a transverse I-beam. The squeeze riveter is similarly supported for transverse movement. It also has a spring balancer by which it is raised and lowered. The carriage device moves from seam to seam on the outer flanges of the side channels of the roof jig.

The two sections of each car end are assembled in a special end-assembly jig. The bottom section is supported by members of the jig. The top section is lowered into place by the overhead crane and temporarily bolted to the bottom section for the start of the riveting operation. Each pair of sections is drawn tightly together by key and wedge fit-up bolts used for this operation. The assembly jig has a daily capacity of ten completed car ends; eight are used in the present program.

The end-assembly racks are constructed with 6-in. channels forming the vertical supports. The channels in turn are supported by two 10-in. bottom channels which run lengthwise, the bottom and the vertical channels being joined together by bolting and welding. Cross channels of the same dimensions as the bottom channels run between the latter at intervals of about 10 ft.

The platform on which the workmen stand or sit in the performance of their duties is supported by a 3-in. angle at each end. The angles for the top platform are placed with the horizontal flange on the bottom, and the angles for the lower platform are placed with the horizontal flange on top. The upper platform slides in the top angles. The lower platform is adjusted for position by moving the angle which has a slotted opening.

The bottom platform is located about three feet above the floor and the top platform about eight feet above the floor. The boards in the bottom platform are held in



The interior of partially completed box car

place alongside each other by a length of wood of 2-in. square cross section which runs transversely with respect to the boards. The top boards receive additional reinforcement from a piece of ¼-in. by 2-in. strap iron running at a 45-deg. angle with one end bent for fastening to the vertical channel and the other end bent to fasten to and support the boards.

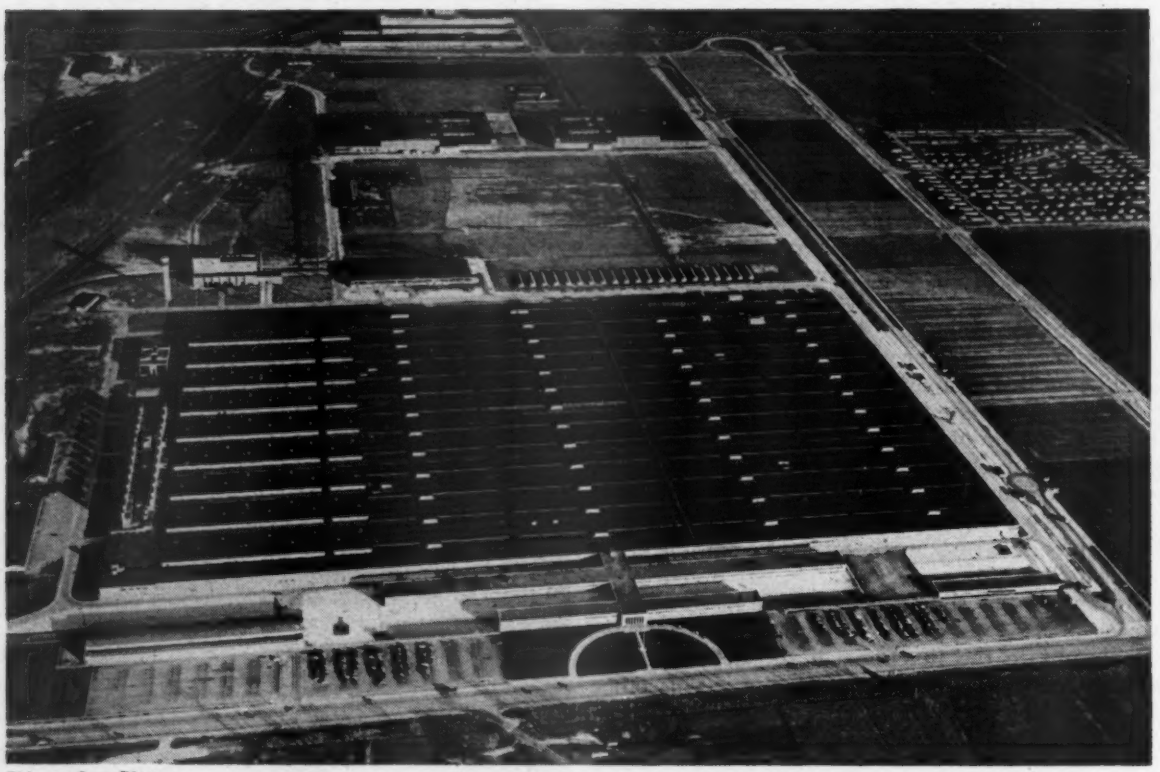
The bottom section of the car end is held in an upright position in the jig. The top section is keyed to the bottom section and to the jig and then riveted together in a vertical position, thus saving considerable floor space.

Upon completion of the roof, side and end riveting, the floor and furring are applied. The flooring is applied first, the holes bored, and the floor bolts applied. While tightening the bolts with an impact wrench the furring is put up. In the final operation within the shop the lining, the couplers, and air hose are applied. The doors are adjusted and the door tracks riveted. The brakes are tested and adjusted and the car inspected. The car is then set out for painting, weighing and stenciling.

In the painting operation the roofs are primed with a galvanized primer and the ends with zinc chromate. The sides and underframes are furnished already primed. Two coats of paint are then applied, the cars weighed and stenciled, and given a final inspection.

SIMPLIFIED NUMBERING ON THE MONON.—In the interest of reduced figure writing, the Monon is attempting to establish a series of numbers which will employ the minimum digits necessary to distinguish cars, locomotives and trains, and so reduce the opportunity for error in transmitted messages or on written reports.

Machine Tool Show at Chicago



Chicago Sun Photo

First show in 12 years will feature products of 275 manufacturers, cover a half-million square feet of floor, and represent 16 million dollars

DURING the period between September 17 and 26 the first machine tool show to be held under the auspices of the National Machine Tool Builders' Association since 1935 will be held at the Dodge-Chicago Plant. The total number of exhibitors for this show has grown to almost 300 and the nine-day working demonstration in what has been termed the "world's greatest machine shop" will feature in the neighborhood of 2,000 machine tools, forging machines and metal working tools representing the products of 150 members of the N. M. T. B. A. and about 125 manufacturers of related equipment such as cutting tools, measuring instruments, attachments and accessories. The exhibit is reported to represent approximately $16,000,000 worth of machinery and will occupy about 12 acres of space. The show will be open every day during the nine-day period.

Many of the machine tools that will be featured at the show will be entirely new in design and some of the exhibitors will have between 25 and 30 machines on display. Among the exhibitors will be found a number of tool builders that are well known in the railroad shop field and while the actual demonstrations of railroad machining jobs will be relatively few as compared with the many thousands of job demonstrations in the entire show the principal value of the show to the railroad visitor will be the opportunity to see the character of work, the methods employed and the tooling equipment used by other industries. Many of these modern methods can readily be adapted to the machining operations that are now becoming common to railroad shop work.

Herbert H. Pease, president of the New Britain Machine Company, is president of the National Machine Tool Builders' Association, and K. H. Hobbie, president of the Chicago Technical Societies Council, is president of the Machine Tool Congress which will present the technical sessions contributed by the membership of technical groups such as the American Society of Mechanical Engineers; American Society of Tool Engineers; Society of Automotive Engineers; American Foundrymen's Association; American Machine Tool Distributors' Association; Chicago Technical Societies Council, and National Electrical Manufacturers' Association. The Machine Tool Congress will hold nightly sessions at which papers and discussions will touch upon the latest developments in the metal working industry.

On September 23 there will be a formal dinner welcoming overseas guests at the Palmer House. Charles J. Stilwell, president, Warner & Swasey Company, will be the toastmaster.

The chairman of the show committee is Swan E. Bergtrom, sales manager, Cincinnati Milling Machine Company, and serving with him are W. L. Dolle, president, Lodge and Shipley Machine Tool Company; R. W. Glasner, president, Clearing Machine Corporation; H. G. Hoglund, vice-president, Van Norman Company; R. J. Kraut, president, Giddings and Lewis Machine Tool Company; D. M. Pattison, vice-president, Warner & Swasey Co., and L. Polk, president, Sheffield Corp.

The program of the technical meetings of the Machine Tool Congress appears elsewhere in this issue.

EDITORIALS

Production Costs

Probably at no other time in the history of railroad operation has it been as necessary for the men in the mechanical department responsible for servicing and repairing cars and locomotives and for manufacturing equipment parts to survey the terminal and shop operations and figure out more economical methods for doing this work. High labor costs have made many changes involving a reduction in man-hours not only more attractive but in many respects downright essential in keeping these expenses in line with the funds available for servicing, repair and manufacturing operations.

What is the approach to this problem? A survey may show that a change in one factor affecting production may solve the problem but in general the best results are usually obtained by changes involving several interdependent factors. For instance, a new machine tool with the capacity to turn out a piece of work in one-half the time required by the machine tool it replaced can not be utilized to its full capacity if the units of work can be made available to the machine only at a rate that is 25 per cent faster than the one with which the former machine was supplied. Any work involving a sequence of operations must be limited by the operation that consumes the most time per unit, an operation that is commonly referred to as the "bottleneck." Many an operation has been speeded up by new tools or new methods only to be slowed up by a bottleneck in another operation on which it is dependent. Therefore, a careful analysis of every phase of a job must be made if anticipated results are to materialize. The foresight used in planning more economical methods for doing work can hardly be expected to be perfect. "Bugs" are almost sure to develop in any new arrangement or installation, but good planning will eliminate most of them before they develop.

What are the factors that affect production in a shop and terminal facility? The most important one is that responsible for the "bottleneck." It may be a machine tool. It may be material-handling equipment. It may be the layout of a shop or terminal. It may be that there are several bottlenecks and a complete replacement of existing equipment and a new shop or terminal layout are needed.

A good example of the economy resulting from an analysis of every phase of a job and then taking care of each of the factors that affect production is afforded by the description of the new flue shop, planned and installed by the Baltimore & Ohio at Cumberland, Md., which appears elsewhere in this issue. The reduction of man-hours by an eight-to-one ratio was made possible by several changes but the basic one to which the entire shop is geared was the replacement of the old flue tumbler or rattler by a flue-cleaning machine that altered completely the former method of removing scale from flues and tubes. Then, by combination of a complete new layout of the shop and the installation of material-handling equipment, automatically controlled, the unproductive man-hours consumed in moving work from one operation to another was made almost negligible. Finally, some of the machine operations were made automatic, changes involving the application of existing devices to existing equipment.

Examples such as this one are needed to show railroad managements that real economies can be made by the use of new equipment and by a detailed study of all the factors involved in making full use of the equipment. It is only by means such as these that mechanical-department officers can keep production costs within reasonable limits.

A Liberal Education All in a Single Month

Were it not for the fact that it is a matter of utmost importance we should hesitate again to call attention to the railway operating expense items of locomotive repairs, steam and other, for, many times in the past few years, mention has been made that this (steam locomotive repairs) is the largest single railway operating expense account. The expense in connection with "other locomotive repairs"—electric, Diesel-electric or gasoline—is rapidly approaching substantial proportions, too.

By way of explanation, it may be worth while to interject here the acknowledgement of comments previously made by some of our readers to the effect that they had been under the impression that fuel, or wages, were the largest items of operating expense. It will, no doubt, help to clear this point up to say that these are general categories of expense but that they are divided among several accounts. When the expense item of steam locomotive repairs is spoken of we are referring to that expense chargeable to I. C. C. Account No. 308 which includes not only materials but wages as well.

The reason for re-emphasizing the fact that locomo-

tive repairs stand out head and shoulders above all other individual accounts is that it is usually considered sound logic to assume that where the most money is spent there also should be the greatest opportunities for effecting economies.

If one is to save money in making repairs to locomotives, it is a very simple job. All you have to do is to find ways to save materials and man-hours of labor. Never before in the history of railroad operation has the need to do this been as great as it is right now nor have the opportunities to accomplish such an end been as plentiful as they are at this time. If there is any doubt as to the need, one need only consider that, in mechanical-department operations, since 1941 materials have gone up in cost from 40 to 50 per cent and the labor cost, through wage increases and the slowing down of productivity, has gone up from 75 to 100 per cent. Whereas, before the war a dollar of locomotive repair expense represented about 55 cents for labor and 45 cents for material, labor now takes from 65 to 70 cents out of that dollar and you can try to buy the materials, at inflated prices, out of the other 30 to 35 cents.

It is not too difficult to see that the expenditure of each and every dollar of a railroad's budget requires far more intelligent thinking today than it did in 1940 or 1941 and that thinking has to be done, as far as the mechanical department is concerned, by the management and supervisory staff in order that the chief mechanical officer may be in a position to go before the railroad company's budget committee with sound recommendations not only as to how his departmental allotment should be used but with all the facts and figures to enable him to suggest the logical course to pursue in the matter of capital expenditures which affect his ability to operate from day to day with maximum economy.

Unfortunately, relatively few chief mechanical officers reached their positions through engineering channels. The very nature of railroad mechanical-department operations have for the most part, in the past at least, dictated that top mechanical management should be, predominently, clothed with the ability to handle men and to organize the thousands of details involved in the maintenance of locomotives and cars in such a manner that good cars, and good locomotives, would always be on hand when the transportation department wanted them, and that all of this would be done within a shrinking budget allowance. So, today, many mechanical officers find themselves face to face with a job for which, through no fault of their own, they have not been too well trained—a job not of handling men and organizing the details of operation alone but a job of industrial management, or engineering as well. For, by no stretch of the imagination, can the policies and methods of the past 20 or 30 years extricate railroad management from the predicament that it faces in the next five to ten years. Nothing but sound industrial engineering principles intelligently applied by men with a background of railway operating experience will solve today's problems with respect to the need for economy in operation.

What are some of these problems? The replacement of reciprocating steam locomotives with internal combustion, steam- or gas-turbine locomotives is a major problem because the natural trend of development has forced it upon the railroad industry, whether they choose or not. But, it is at this point that mechanical men are also forced to face related problems that have to do with engine-terminal facilities, fuel and water facilities, what to do about back shops: to modernize existing plants or abandon them and build new ones. These are not problems that can be solved by individuals for no individual has the experience needed to solve them. They are industrial engineering problems and can be approached only on an engineering basis—one designed, first, to gather all the facts, then analyze them and finally make logical decisions based upon such an analysis in the light of conditions as they exist today and as they are likely to exist for some years to come.

Very few railroads have an engineering staff large or experienced enough to deal with these problems with the same vision as similar ones have been dealt with in other industries. For the great majority of roads that have no adequate engineering staffs there is not much choice in the course that has to be taken—either to retain experienced industrial engineers to come in and study the problems that the individual road is faced with and make recommendations; to consult with other roads that have already made progress along the lines of rehabilitating their facilities with a view to future economies in operation, or to take the slow, painful and expensive process of trying to muddle through a job that too often leads down the road to receivership because of this kind of a decision.

This month of September should mark a high spot for the mechanical department men of American railroads for, in Chicago, between the seventeenth and the twenty-seventh of the month there is offered one of the most intensive courses in subjects related to the operation and maintenance of motive power and rolling stock yet to be presented for the benefit and education of mechanical-department men. Between the vast machine-tool show to be staged at the Dodge-Chicago Plant by the National Machine Tool Builders' Association, the technical meetings of the Machine Tool Congress sponsored by the American Machine Tool Distributors' Association, American Society of Mechanical Engineers, American Society of Tool Engineers, American Foundrymen's Association, National Electrical Manufacturers Association, Chicago Technical Societies Council, Society of Automotive Engineers, and, finally, the meetings of the Railway Fuel and Traveling Engineers' Association, Car Department Officers' Association, Locomotive Maintenance Officers' Association, Boiler Maker's Association, and the Air Brake Association, the railroad man will not only have a golden opportunity to learn, at first hand, about the problems of the other railroads, how they have been

solved or what steps are being taken toward their solution, but he will have that most valuable opportunity of all—the chance to associate with railroad men from the far corners of the country and, in small groups, get the real "low-down" on what to do about it.

Too often railroad managements and managing officers have looked upon meetings of this kind as something that a man is allowed to go to "if he can be spared from the job." Isn't it about time that the thinking be reversed and it be made a definite part of the job to have selected men from every railroad in attendance at these meetings with instructions to get information, from one source or another, on specific problems and report back to the home road as to their findings? This is a most necessary first step to take and, considering its potentialities, the price is very reasonable.

George May Do It Wrong

September 30 and October 1 and 2 have been set aside for meetings of the two A. A. R. Electrical Sections. The Engineering Section will meet on Tuesday, September 30 and the Mechanical Section on Wednesday and Thursday, the first two days in October. The place will be the Hotel Sherman in Chicago. There will be no exhibits by the Railway Electrical Supply Manufacturers' Association.

That it will be an important meeting seems an assured fact. There are many relatively new railroad applications of electrical equipment which require orderly study by Section committees, and as evidenced by the June, 1947, exhibits of the Railway Supply Manufacturers' Association in Atlantic City, N. J., there are many completely new things now being manufactured or soon to be available which warrant consideration by the Sections. The Atlantic City meeting was a great success as measured by the manufacturers' exhibits. It was somewhat disappointing in that there was no meeting of the Mechanical Division's Electrical Section and no electrical subjects on the railroad program. This was somewhat offset by a meeting of the Board of Direction, Electrical Section, Mechanical Division, which was also attended by chairmen of the technical committees. It served effectively in the guiding and planning of work being done on reports to be presented at the annual meeting to be held in the fall in Chicago. A high spot of the June meeting was that tentative agreement was reached on means for connecting communication circuits between cars. This has been a difficult problem, but its solution has been made possible because the Section acted quickly before individual railroads installed a large amount of different equipment which would make standardization impossible.

Another factor favoring the progress of association activities is that J. A. Andreucetti, long-time secretary of the Association of Railway Electrical Engineers and the Electrical Section, Mechanical Division, has retired as chief electrical engineer of the Chicago & North Western and the Chicago, St. Paul, Minneapolis & Omaha and is devoting a greater part of his time to the interests of the Section.

Members of both sections are fully aware of the growing importance of association work and it is urgently to be hoped that pressure of affairs at home will not keep them from devoting two or three days to the Chicago meetings. Work done there requires the best brains there are available and affects all railroads. If some are not represented, they may discover they are seriously inconvenienced by the establishment of practices not adaptable to their requirements. They should not let George do it. He may do it wrong.

Machine Tools

In an article on another page in this issue V. P. Schmidt, works engineer, Pennsylvania, names the problems with which the railroads are confronted in connection with machine tools thus: working to close tolerances, maintaining accuracy with a minimum of effort and skill, and providing for the use of carbide and high-speed-steel tools. He then proceeds to enumerate the specific features which the railroads should look for in some eleven types of equipment commonly needed in railroad shops. Among the features of the various types of machines mentioned are hardened-and-ground ways, hardened-and-ground gears, turret tool posts on engine lathes, anti-friction spindle bearings, hydraulic drives and feeds, duplicating equipment on engine lathes, and central lubricating systems.

Those who read this article and then turn to the New Shop Tools and Equipment pages will find an impressive number of the new tools described which meet the author's specifications in many of these respects. Among the upwards of 30 machine tools described, the use of automatic central oiling systems is outstanding, centralized controls are almost universal, and dial indications of speeds and feeds are employed on some of them. There are several instances of automatic duplicating equipment on engine lathes. And, in the matter of movement of parts between machines, a complete axle-finishing line is described in which all of the automatic handling is included with the machine tools.

These machines represent, no doubt, but a small proportion of the total number of those suitable for use in railway shops which will be on display at the National Machine Tool show to be held in Chicago, September 17 to 27, inclusive, and thus available for those attending the Coordinated Associations meetings who are interested in machine tools. This applies to those with responsibilities for car-department wheel shops as well as those interested in locomotive machine shops.

Roll-Out Battery Boxes

Southern Pacific adopts practice which insures proper flushing of cells, reduces length of inter-tray connectors, improves ventilation, reduces accumulation of dirt and facilitates maintenance

Electrician about to straighten out the hinged portions of the track on which the battery cradle can be rolled out for battery servicing—The battery is shown here in operating position fully inside the car body, with the tracks folded in front of the cradle—In operation, the battery box doors would be closed and locked in place

REGULAR flushing and cleaning and occasional shopping are essential to dependable battery performance. The nature of this required attention has changed only a little since the first storage batteries were installed on railroad cars, but doing this servicing has become increasingly difficult as the battery sizes have been increased to meet the larger electrical loads for air conditioning, improved lighting, and various electrical devices. Weight has risen to as much as 400 lb. per five-cell tray, and vertical clearance above the battery has been reduced so that tops of cells are less accessible.

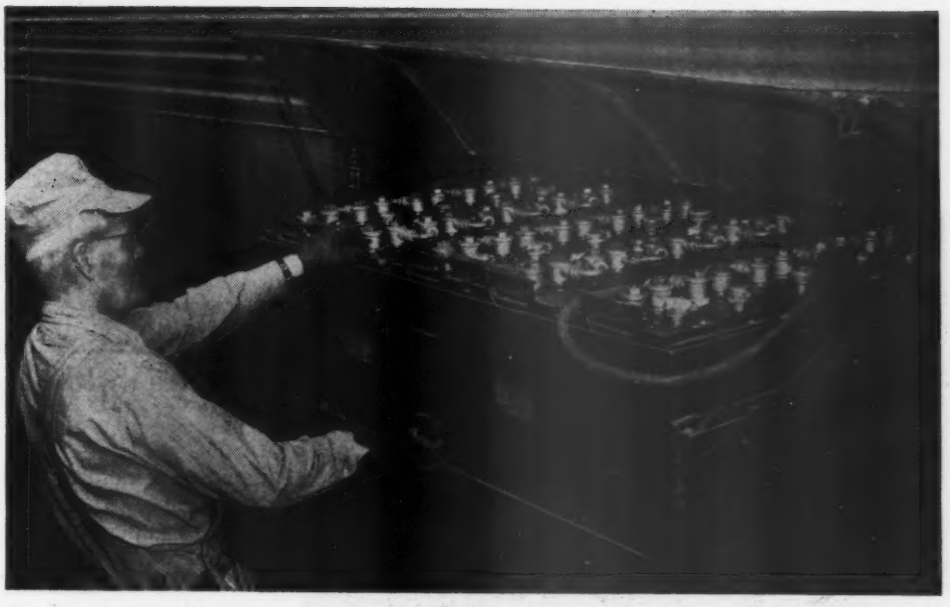
Representatives of the Southern Pacific Company and the Storage Battery Division of Thos. A. Edison, Inc., felt that if the battery could be easily rolled out to the side of the car body, where it would be completely accessible, better attention would be given the battery.

The battery supplier provided a cradle similar to the type used in industrial trucks, with a four-wheel roller assembly at each end, and the railroad company shop forces equipped an existing battery box with a suitable set of fixed and hinged tracks for the cradle. It was found that when the battery was assembled into the cradle it occupied less floor space than a conventional five-cell tray arrangement.

When the battery is in the box, the hinged portion of the tracks folds in front of the cradle as shown in one of the illustrations, and the battery-box doors are closed and locked in place. Because the rollers are equipped with ball bearings, one workman can roll out the set of 25-cells of A-16-H in the cradle with ease, and he then has access to all of the cells for flushing and cleaning. Stops are provided on the track so that the cradle can only be moved out the distance required for servicing.

The principal purpose of the roll-out cradle application is to facilitate servicing and general inspection of the battery. The hazard of failing to flush all the cells, particularly those in the rear, is minimized, damage to the cell covers with the flushing device is reduced, and failure to close the covers becomes inexcusable. Other advantages are improved ventilation about the cells, and reduction in dirt accumulation in the bottom of the battery box. The total length of the inter-tray connectors is reduced approximately 10 feet in the type A-16-H battery used, thereby reducing

In case the battery is to be shopped it can be removed from the car by lift truck as shown



Pulling battery cradle out for servicing—Stops on the track prevent its being pulled out too far

voltage drop and cable maintenance. Also, skid boards, buffer blocks and buffer strips on the ends and sides of the trays can be eliminated. The total weight of battery and cradle application is approximately the same as with the conventional battery box.

When it is necessary to remove the battery from the car, it may be handled as a complete unit, as the cradle can be lifted off the track with a fork-lift truck or crane type truck. Platform height with respect to rail height is not critical when using these types of trucks as is the case when trays have to be lifted out to a truck or trailer.

Fork-lift trucks are available in most Southern Pacific yards for removing and applying Waukesha engine-generator units and Waukesha air conditioning units, but if a fork-lift or crane type truck is not available, the battery and cradle can be handled on a conventional truck normally used for batteries. In this case, bars or jacks would be used to raise the cradle clear of the stops; and once clear, the cradle would be lowered on to the yard truck.

The first roll-out cradle was applied in October, 1945, to a lightweight car equipped with 25 cells of Edison type A-16-H battery on Southern Pacific's "Lark" train operating between San Francisco and Los Angeles. This roll-out cradle has been in continuous service for over 18 months.

Southern Pacific Company has specified roll-out cradles for all of the batteries for the 52 new cars now being built by Pullman Standard Car Manufacturing Company. Edison type A-12-H, A-16-H and A-20-H batteries will be used in these new cars. It is planned to standardize on two roll-out cradle sizes, using one size for both type A-16-H and A-12-H, and one size for type A-20-H. The battery boxes are so designed that they will accommodate either the battery assembled in the steel roll-out cradle or the conventional type assembly of the same size battery in individual wood trays.

Adding water to battery cells —The box hanging from the operator's shoulder is part of an electrical device which sounds a signal when the water level is at the proper height—This photograph shows the relatively short inter-tray connectors

Vertical-Axle Generator Drive

Reverse-current relay, and generator regulator, and generator ventilating duct in the upper part of the cabinet

New York Central trying new type of gear drive which delivers power from the end of an axle to a generator inside the car body for cars with light electrical loads

THE New York Central is testing a new type of vertical drive for 2-kw. generators to supply the electrical requirements of combination passenger-baggage cars. The drive, which was developed by the Spicer Manufacturing Division of Dana Corporation, Toledo, Ohio, is vertical, and consists of a spiral bevel gear driving from one end of an axle, the power being passed by means of a vertical splined shaft with two universal joints to a vertically mounted generator inside the car. The drive has a capacity of 3 kw. and was designed to produce a smaller and less expensive drive than is possible when power is taken from the center of the axle. Any drive on the center of the axle must have a relatively large diameter, since it must be large enough to pass over the greatest diameter of the axle, or must be a split drive. In either case, very large bearings and gears are required. The vertical arrangement permits the generator, clutch, and one of the universal joints to be mounted inside the car body, fully protected from adverse weather conditions.

To provide a quick and easy access to the journal box, the gear unit is mounted on two hinges, which allow it to be swung laterally without disconnecting the propeller shaft, thus making a convenient means of lubricating or replacing the journal bearings. When the gear unit is in place, it is secured by two hand-operated locks. The drive between the axle and the gear unit is effected by a short coupling which fits respectively into a collar on the end of the axle and into the hub of the gear. This coupling is designed to allow for all angular movement due to misalignment or journal bearing wear, and provides for the full endwise float of the axle. The gear unit support is bolted to a flange welded on the unstressed end

Left: Drive unit swung out on its hinges to allow for journal lubrication—Right: The locker in the car which houses the generator below, and the reverse-current relay and generator regulator above

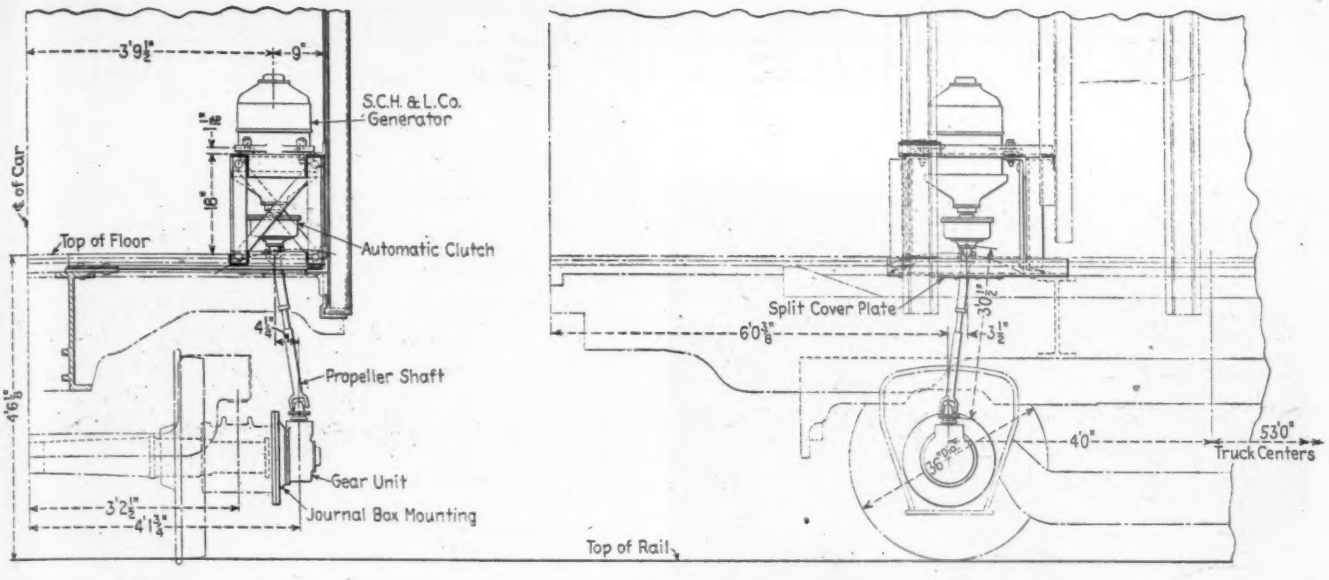
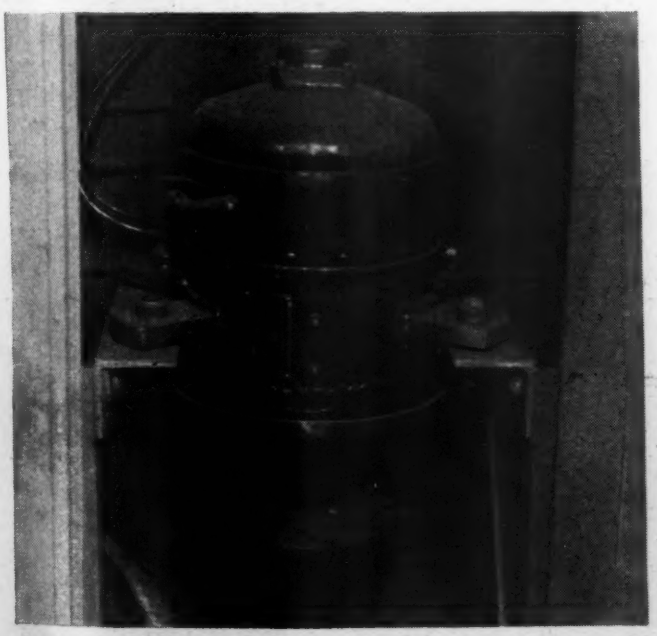


Diagram showing the manner in which the drive and generator are mounted in the car

of the journal box. The spiral bevel gear and pinion are mounted on taper roller bearings. The lubrication system is entirely self-contained and is in no way connected with the lubrication of the journal bearings. Both the gears and bearings run in a constant bath of light oil, completely sealed and protected.

The vertical arrangement also makes it possible to use a short, light propeller shaft, requiring but small angular



Safety generator and automatic clutch in the lower part of the cabinet

movement and a minimum of spline slip, resulting in excellent balance and performance at all speeds. The propeller shaft is only 30½ in. long. The lower end is fastened to a flange on the pinion and the upper end is connected to a small automatic clutch.

The automatic clutch remains disengaged until a speed of 6 m.p.h. has been reached, thereby preventing shock loads when switching cars, etc. It also disengages again when the car speed drops below 6 m.p.h. The weight of the complete drive, including the journal box mounting, coupling, gear unit, propeller shaft and automatic clutch is 152 lb.

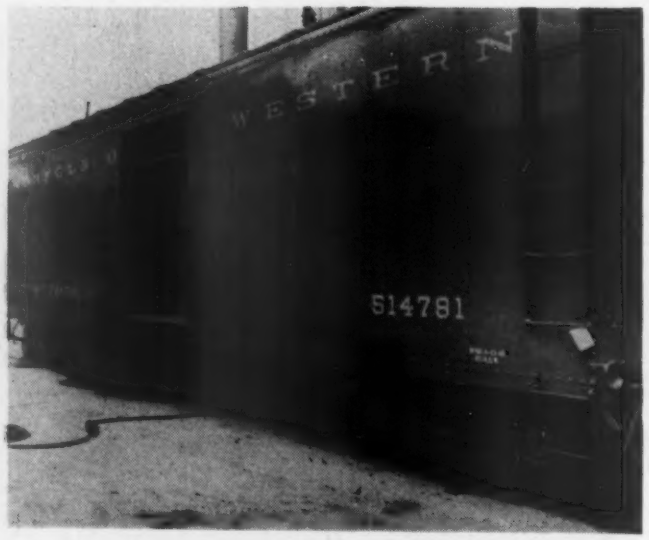
The car has 36-in. wheels and the gear ratio is 3.70. With a car speed of 100 m.p.h., the generator is running at 3,450 r.p.m.

The generator, made by the Safety Car Heating and Lighting Company, Inc., New Haven, Conn., is a type BC-2750 machine. It is designed to deliver its full load of 50 amp. and 40 volts at 750 r.p.m., corresponding to a car speed of 21.7 m.p.h. The maximum speed of the generator is 4,600 r.p.m. It is supported on resilient mountings and has a rocking brush type of pole charger. It has a lower roller bearing, and a top ball bearing of extra size to carry the vertical load. The generator is totally enclosed, but has an external fan which forces ventilating air along the surfaces of the generator. It employs a standard S-150-EA regulator and a S-10-EA reverse current relay. The battery on the car is a 16-cell lead-acid type, rated 300 amp.-hr. at the 8-hr. rate.

* * *

A longitudinal seam in a steam locomotive boiler being welded by the submerged arc process—Scene in the American Locomotive Company plant, at Schenectady, N. Y., taken from "Electric Arc Welding," a motion picture in color and sound, produced for the General Electric Company by the Raphael G. Wolff Studios, in Hollywood, Calif.

N. & W. Finds Power Car Useful



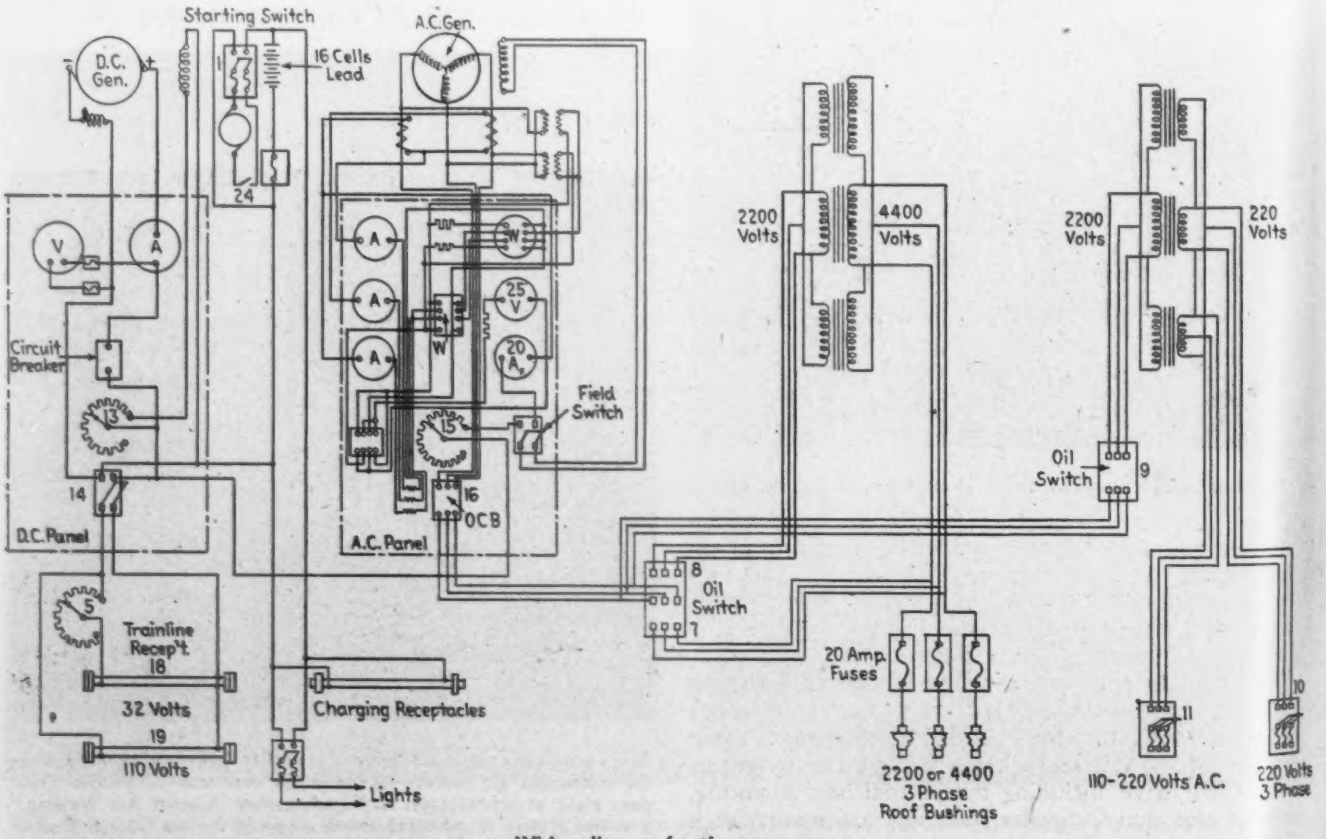
N. & W.'s electric power car

Car equipped with engine driving two generators supplies power in a variety of forms to meet practically any emergency requirements

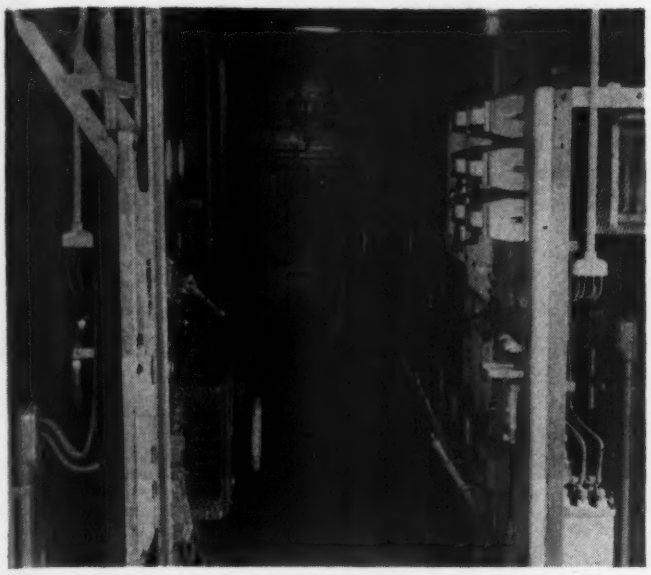
THE Norfolk & Western now has in operation an electric power car which is capable of delivering direct current in varying voltages up to 75 kw. at 250 volts and alternating current in voltages ranging from 110 to 4,400, a total of 90 kva. being available at the higher voltages. The car is a box-express car which can be operated in passenger train service. It is equipped with a 125-hp. Diesel engine, direct-connected to a 75-kw., 250-volt d.c. generator and a 90-kva., 220-volt, 3-phase, 60-cycle, a.c. generator. It can be used to supply power to signal primary circuits, to function in the case of a signal substation failure, to supply power to as many as 12 parked Pullman cars, to charge batteries, and a variety of other purposes. So many uses have been found for the car that it is in service a substantial part of the time, and will apparently become a permanent piece of equipment.

The engine is supplied from fuel storage tanks, mounted underneath the car, having a total capacity of about 300 gal., with a filler pipe on the inside of the car. The d.c. generator can be used at voltages ranging from 50 to 250. The a.c. generator is a 90-kva., 2,200-volt, 3-phase, 60-cycle machine, and through the medium of transformers, the car will deliver 90-kva. of 3-phase power at either 2,200 or 4,000 volts, or 75 kva. at 220 volts, 3-phase. It will also produce 25-kva. of 110/220 single-phase power.

Direct current is supplied through either or both 32-volt and 110-volt trainline receptacles on both ends of the car. Alternating current is supplied through high-tension bushings on the roof of the car for 2,200 or 4,400



Wiring diagram for the power car



The d.c. switchboard is shown on the left and the a.c. switchboard on the right—Low-voltage transformers are in the left background and the high voltage transformers on the right

volts, 3-phase, or through fused switches on the inside of the car for 220-volt, 3-phase, and 110/220-volt single phase. A 32-volt, 16-cell lead-acid battery on the car supplies power for auxiliary circuits, for lighting when the plant is not running, and for engine starting. It may be charged from the d.c. generator, or from an external source, through charging receptacles located under the car. The batteries are connected in series with the a.c. generator field, so that they are charged by the filed current when the plant is in operation. The a.c. generator field is always excited, whether or not the a.c. generator is needed for load.

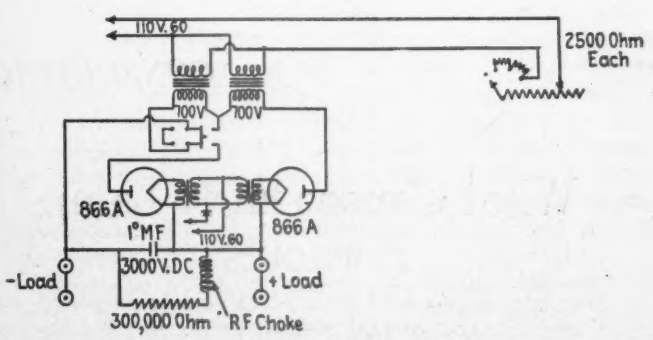
An understanding of how the various types of power are obtained may be had by reference to the diagram. To obtain 2,200 volts from the roof bushings with the engine running at rated speed, rheostat No. 13 on the d.c. panel is adjusted until the d.c. voltmeter reads 110 volts. Circuit breaker No. 12, and then field switch No. 17 on the a.c. panel are closed, and the field rheostat No. 15 is adjusted until the a.c. voltmeter reads 110 volts. This is equivalent to 2,200 volts at the a.c. generator terminals. The fuse disconnects are then engaged and the load connected to the roof bushing terminals on the car. Oil circuit breaker No. 16 on the a.c. panel is then closed, and the double-throw oil switch is thrown to the No. 7 position. The procedure for obtaining 440 volts is the same except that the double-throw oil switch is engaged in the No. 8 position. To obtain 220-and 110-volt power, oil switch No. 9 is closed to connect the low voltage transformers, and power is obtained through switches Nos. 10 and 11 as indicated.

To obtain 110 to 250 volts d.c. power, rheostat No. 13 on the d.c. panel is regulated until the d.c. voltmeter indicates the desired voltage. The d.c. circuit breaker is then closed and the field switch on the a.c. panel is closed. Field rheostat No. 15 on the a.c. panel is then regulated until the a.c. voltmeter reads 110 volts. This is necessary to accomplish battery charging at all times the engine is in operation. The load is then connected to trainline receptacle No. 19 and d.c. switch No. 14 is closed to complete the circuit. Lower d.c. voltages are obtained through trainline receptacle No. 18 by the use of rheostat No. 5. A portable voltmeter across the train line receptacle is used to determine the value of the lower voltages.

The power plant—Both d.c. and a.c. generators are on the same shaft

Power Supply For Meter Testing

Electrical meters on Diesel locomotives must be checked and corrected periodically. On the Denver & Rio Grande Western, this is accomplished by comparing the locomotive meters with portable instruments of known accuracy. The portable instruments are in turn checked at regular intervals with General Electric standard instruments. The railroad has two of the latter, one a voltmeter with a 0-700 and 0-1500 scale and the other a milliameter with a 0-200 scale. To make the tests it is necessary to have a source of d.c. power at voltages ranging from 0 to 1500 and current values from 0 to 0.250 amp. A power supply unit to fill these needs, designed and built by J. G. Weber, electrician, D. & R. G. W., is now in use in the railroad's Burnham shops at Denver, Colo.



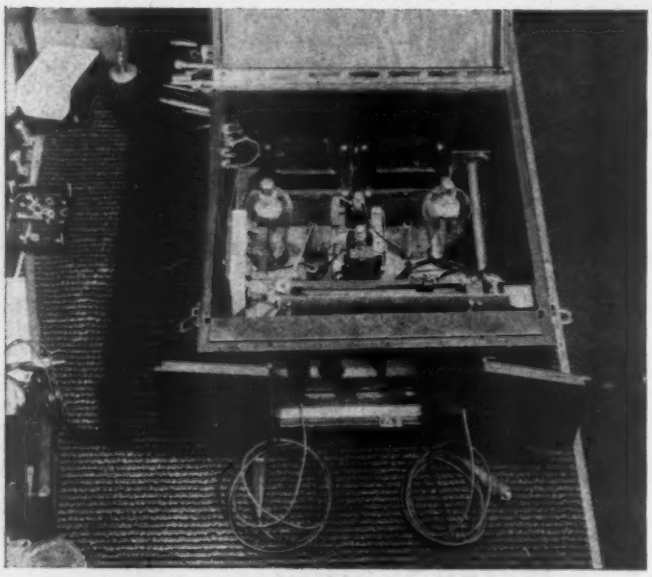
Circuit diagram for the power supply unit

The wiring diagram shown in the sketch is complete except that it does not show the filament transformers

for the two 866A hot-cathode mercury rectifier tubes. The two filament transformers have a ratio of 100/2½ and are connected in parallel.

The plate transformers shown in the diagram have a ratio of 100/700. The primaries are paralleled, and the secondaries are connected in series. With the double-throw switch in the right hand position, the transformers are connected to the plates of the tubes for full-wave rectification and the set will produce d.c. voltages up to 900 at the output terminals. With the double-throw switch in the left hand position, the set will work on half-wave rectification and will produce 1,900 volts d.c.

The difference between the a.c. secondary plate voltage and the d.c. output voltage is created by resonance.



Power unit with cover open—The three controls on the front panel are, respectively, filament on and off, plate resistance selector and variable plate resistor

This is accomplished by the 1 mf., 3,000-volt, d.c. condenser and r.f. choke. The 300,000-ohm load resistor connected across the condenser terminals makes the circuit stable.

The power unit in service

Regulation of the secondary plate voltage is affected by the four-point selector switch and a variable slide type resistor which is connected in the primary circuit of the plate supply transformer. Between the selector switch points in two steps are connected two 2,500-ohm fixed resistors. Between the last step of the selector switch and the return of the 110-volt, a.c. lines is a variable 2,500-ohm resistor.

To protect the operator who may wish to open the lid of the power unit case, there is an interlock switch in the primary circuit which is closed by the closing of the cover. It is a push-to-close spring-opened push button operated by a rubber button on the cover.

The d.c. power is used for making comparison tests of meters used on Diesel-electric locomotives. These include voltmeters, milliameters, transition meters, and electric speedometers. Correction of meters may be required by any of the following causes: incorrect mechanical counterbalance; bent or misaligned hairsprings; cracked jewels; loose staff pivots; infiltration of magnetic foreign matter; change in resistance of series or shunt coils. The reshaping of a hairspring may change its stiffness and this must be compensated for by changing the values of resistors in the electrical circuits.

CONSULTING DEPARTMENT

What Causes Early Lamp Burnouts

We have a number of 200-watt lamps mounted on wall brackets and certain 60-watt lamps in pendant fixtures in our shop that seem to burn out oftener than lamps in other parts of the building. What may be the possible cause?

Lamp Voltage or Vibration

The relatively shorter lamp life experienced in certain locations in the shop—namely, some 200-watt lamps on wall brackets and 60-watt lamps in pendant units, might be due to several factors:

1. The burning schedule. Are these lamps possibly turned on a greater number of hours during the week than the lighting system of the whole plant?

Can you answer the following question? Answers should be addressed: Electrical Editor, *Railway Mechanical Engineer*, 30 Church street, New York 7.

What is the best method of storing transformer oil so as to prevent or reduce its contamination with moisture?

2. The relation of the average voltage at these sockets to the average for the whole shop. Due to differences in size of wire, in circuit loadings and in distance from distribution centers, there is sometimes a considerable spread of voltage at the sockets. A one per cent change in voltage makes a difference of approximately 12 per cent in lamp life.

3. Vibration and shock hazard. There are conditions under which a lamp mounted on a wall bracket may be subjected to more vibration and shock than lamps

mounted in some other positions. If the 60-watt pendant lamps are relatively low, they may be subject to bumps which might shorten the service life. Again, vibration or shock by machinery on the floor above may be transmitted to lamps hanging from the ceiling.

M. A. MORTENSEN
General Electric Company
Nela Park, Cleveland, Ohio

Improved Mounting May Help

When operated at their rated voltage, 200-watt clear-glass lamps designed for general lighting service are understood to have a rated average life of 750 hours, and 60-watt inside-frosted lamps, a rated average life of 1,000 hours.

Various factors, however, affect these values. Some of these factors are the values of more or less fluctuating impressed voltage, vibrations transmitted from various parts of the building, and the angle of lamp mounting.

Impressed voltage.—The life of an incandescent lamp is prolonged by operating at undervoltage, but shortened materially by operating at overvoltage. A 5 per cent reduction in voltage will prolong average lamp life to about 185 per cent. A 5 per cent overvoltage will shorten lamp life to about 60 per cent. Inasmuch as an undervoltage of 5 per cent decreases light output by about 16 per cent, for better operating efficiency, incandescent lamps should not be operated at undervoltage. Inasmuch as voltage fluctuation depends to a certain extent on plant load and on neighboring industrial loads, impressed lamp voltage readings should be taken at regular intervals during periods of twenty-four hours, in order to determine the extent and duration of each fluctuation.

Vibration.—After a lamp has been in service for a certain length of time, its filament sags somewhat and becomes easier to break. This condition accounts for the relatively shorter life of lamps mounted on rigid wall brackets and pendant fixtures with tubular suspensions as a result of vibrations transmitted from operating machinery.

Vibrations may have their origin in the reciprocating parts of a steam engine, compressor, Diesel engine, their intakes or their exhausts. Considerable vibration is also caused by drumming boilers which set up compression waves in their fire boxes and cause serious vibration in the various parts of the building. If the wall or part of building to which the brackets or suspensions are fastened have a natural frequency of vibration near or coinciding with that of an engine setting up periodic impulses, severe vibrations and shorter lamp life may result. Spring mountings for brackets or sockets and flexible connections for suspensions are the suggested vibration absorbing remedies.

Angle of mounting.—The life expectancy of an incandescent lamp is usually normal when mounted in a base up, vertical position. Lamps mounted at an angle do not stand up as well. If the lamps in the brackets are used in an inclined position, angle reflectors with vertical sockets may be used.

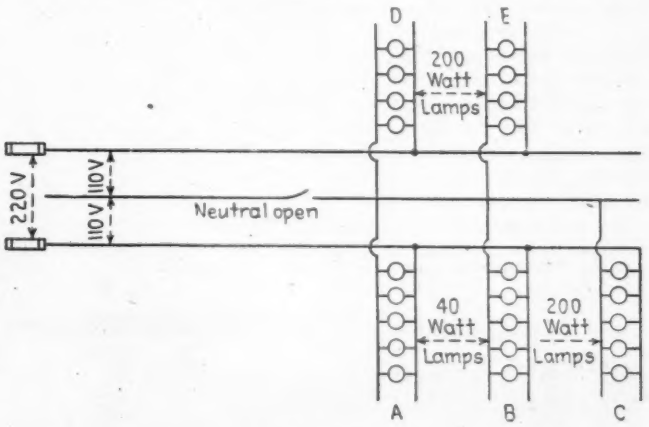
Lamp life. — The possibility exists that the lamps in this part of the building are used during much longer periods than lamps in other parts of the building and average lamp life only seems too short. For instance, if the shop has eight 200-watt lamps and eight 60-watt lamps located in a comparatively dark part of the shop, necessitating their burning during the day, in addition to the two succeeding tours of duty, the maintainer should expect to replace a 200-watt lamp every four days, and a 60-watt lamps every five days.

R. G. CAZANJIAN

Check Circuits and Conditions Causing Vibration

Excessive voltage is the most usual cause for lamps burning out prematurely. A small percentage of overvoltage materially reduces lamp life. A high voltage condition that would cause lamps to burn out prematurely may be caused by the transformer supplying current for the lighting circuit being connected on a high voltage tap, or, if the service is 110/220 volt three-wire, an open in the neutral wire.

Sometimes lighting transformers supplying current to a long secondary line are connected on a tap to provide higher than normal voltage to compensate for drop in the line so that voltage will not be too low at the end of the line. When this condition exists, services from the line nearest the transformers carry current at somewhat higher than normal voltage. Then if lamps used are



If all lamps on circuits A, B, C, D, and E are turned on, there will be only a moderate variation of voltage on the two sides of the lines—The voltage on A, B, and C will be approximately 117 volts, while on D and E the voltage will be about 103—If 115-volt lamps are used, this variation would not seriously reduce lamp life, but if five of the 40-watt lamps are turned off, either circuit A or B, then the respective voltages would be approximately 126 and 94, materially reducing the life of the lamps carrying the highest voltage and cutting down the amount of light from the lamps on the low voltage side—Then if circuit C was turned off, leaving all other lamps burning, chances are the 40-watt lamps would be burned out almost immediately

rated at 115 volts, hours of service will be shortened. The remedy in this event is to use lamps rated for 120 or 125 volts, to suit existing voltage tests should be made to determine if higher votlage lamps are required before making the change, as lighting efficiency of lamps is materially reduced by using them at voltage too low.

As mentioned above, an open neutral of a three-wire circuit may cause untimely burnouts of lamps. The accompanying diagram shows how this condition may exist. Voltage tests will show if an unbalanced voltage condition exists. The obvious remedy is to find and correct the trouble.

Excessive vibration sometimes causes filaments to break, thus reducing lamp life. Around railroad shops, steam escaping from open pops, blowers working too much open with high steam pressure and oil burning locomotives "drumming" are some sources of vibration that may cause lamp filaments to break. In one instance, at least, railroad offices were located near the outbound lead. Sometimes vibration from oil burning locomotives would make the windows rattle, and incidentally cause lamp filaments to break. In this instance, arrangements were made to spot locomotives further from the office.

The remedy for lamp filaments breaking is to eliminate the vibration, use shockproof sockets or fixtures, or rough service lamps.

W. L. COTTON

NEW SHOP TOOLS and EQUIPMENT

Hydraulic Shaper-Planer

The new feature of the Rockford hydraulic shaper-planer, offered as extra equipment, is a dual-cylinder assembly which provides cutting speeds and return-stroke speeds up to 240 ft. per min. Both the cutting-stroke and return-stroke speeds are infinitely adjustable and may be set independently of one another.

A feature of this dual cylinder assembly is that it provides three levels in cutting pressure without requiring change in the horsepower output of the hydraulic system. In low speed, it provides a cutting pressure up to three times that of a conventional single-cylinder assembly without increasing the horsepower requirements of the electric motor and hydraulic pump. The maximum table feeds and cutting pressures in the three ranges are 260 ft. per min. and 5,000 lb.; 130 ft. per min. and 10,000 lb.; and 86 ft. per min. and 15,000 lb.

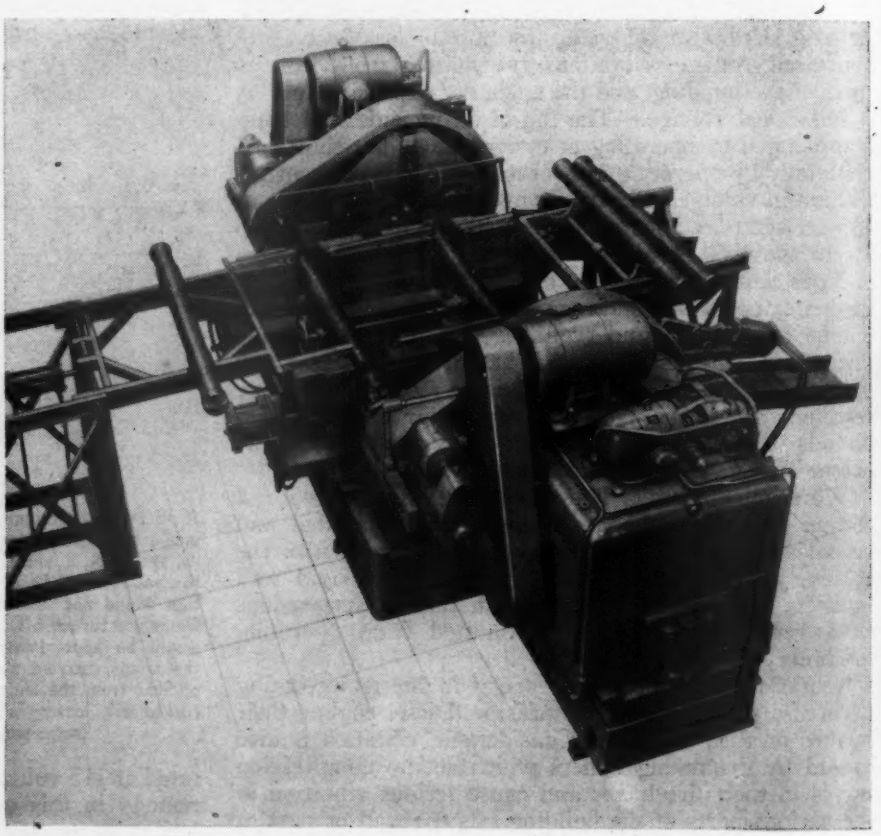
The shaper-planer is a product of the Rockford Machine Tool Company, Rockford, Ill.

Car-Axle Production Machinery

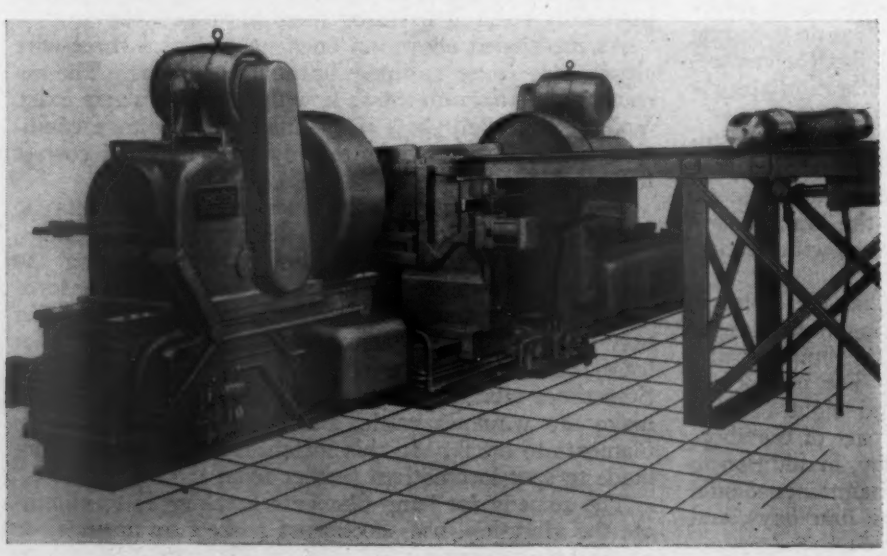
A three-machine system with automatic transfer mechanism between machines has been developed for machining car axles on a mass production basis by the Cross Company, Detroit 7, Mich. This Cross line consists of three Transfer-Matics, the trademarked name given to each machine in the system, with a connecting conveyor. It will handle forgings from 3¾ in. to 10½ in. in diameter and from 5 ft. to 9 ft. in length.

Control of the system is by push button, and once the forging is introduced into the line it can be machined and handled completely without being touched by hand. Chips are automatically disposed of through a chip conveyor and centralized coolant system located beneath the floor level. The crop ends are automatically disposed of and collected in a separate container. Carbide tools are used throughout the line for maximum cutting speeds and feeds. Hydraulic power is used for positioning and clamping the work, for feed and rapid traverse, and for many other important functions of the automatic cycles.

The first machine in the line is a two-station Transfer-Matic that cuts off and disposes of the crop ends in the first station and centers in the second station. The axle is held stationary and the tools rotate to accomplish the work at both stations. Two opposed parting tools are used to cut off the crop end. but before they enter the work a short stubby tool of extreme rigidity removes the scale, thus providing clean metal for the parting tools. These do not cut the crop completely off, but cut a groove and leave the crop attached to the forging by a small neck about ⅝ in. in diameter. The crop is then sheared from



The first Transfer-Matic cuts off the crop ends and centers the axle forgings in two steps



The final Transfer-Matic faces the ends of the axle with a single-point carbide tool

the forging with an automatic shear that enters into the groove formed by the parting tools.

The shearing completes the work at the first station and the axle is transferred to station No. 2 on the first machine. Here the axle is centered with rotating center drills in the conventional fashion, and the centered piece is ejected from the first machine onto a conveyor which carries it onto the next Transfer-Matic. At the same time, with the operation of the transfer device, a new rough forging enters the machine from a loading chute to begin a new cycle.

The second machine in the line is a double-end automatic lathe for rough turning the end collar, the journal, the dust guard and the wheel seat. This is a single station machine and the work is handled but once. One motion of the transfer carriage removes the finished axle and positions a new work piece for turning. The axle is automatically rolled into the

The second machine in the axle-production line rough-turns the end collar, the journal, the dust guard and the wheel seat

machine where it is picked up by centers and rotated by friction pads driving from both ends of the axle. Tools from overhead do the turning while tools from the rear face the shoulders and form the fillets, driven by two 50-hp. motors. The axles enter the machine from a loading chute that is supplied from the first machine in the line, and are ejected onto a conveyor which carries them to the next operation.

The final machine in the line is used to face the ends of the axles smooth to prevent the pick-up of waste in the journal box. The facing cut is performed with a single-point carbide tool after the axle has been supplied from the loading chute from the preceding machine. The axle is held stationary in a pair of vee clamps while a tool feeds across the face of the work and rotates simultaneously. The finished axles are ejected from this machine onto a conveyor and are crated for shipment. This Transfer-Matic has twice the productive capacity of the other machines in the line and can be arranged so as to handle the production from two each of the preceding machines in the line if desired.

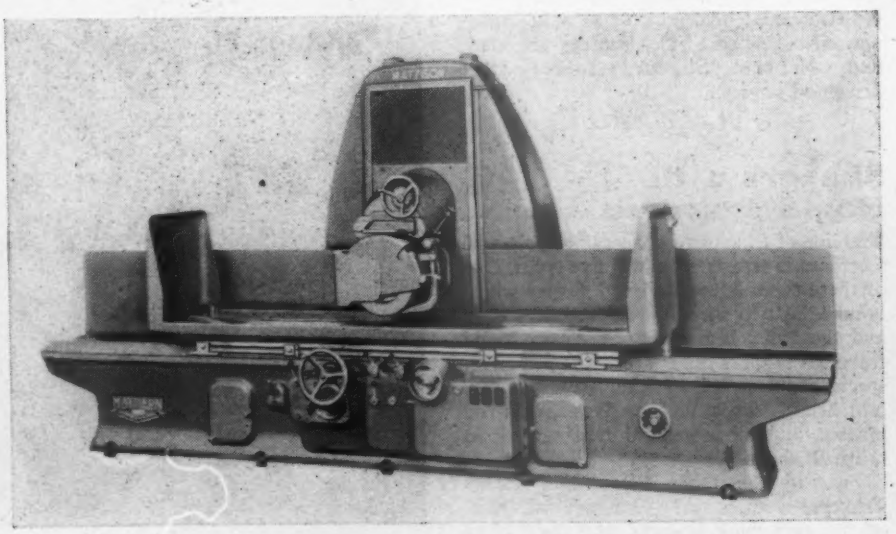
Surface Grinder

The Mattison Precision Surface Grinder with hydraulic feed handles regular flat work as well as large-size castings weighing up to five tons. Flat and V-type ways, as well as contour work, can be ground by a wheel that has been dressed to an angle or radius. Shoulder and edge work can be ground because of wheel clearance and spindle construction, and, in many cases, multiple punching dies can be resurfaced without removing leader pins.

A feature of this line of machines is the double-column support for the wheel-slide assembly. Wide bearing surfaces on the face of the columns and dovetail bearing surfaces on the back provide an eight-point support. The wheel-spindle, with its totally enclosed built-in motor, is mounted in a heavy housing. The table has a non-differential, twin-cylinder hydraulic drive, with equal speed in each direction, as well as fully cushioned, smooth reversal and positive longitudinal travel of the table. The transverse feed of the wheel is also hydraulically operated. All operating and adjusting controls are at the front of the machine.

The grinding-spindle lubricating system is entirely independent of the rest of the machine, having its own pump, motor and oil reservoir built into the rear end of the housing of the wheel slide. A pressure control switch prevents operation of the spindle without adequate lubricant pressure. The front spindle bearing is an adjustable bronze sleeve, oil lubricated from the pressure lubrication system. The pre-loaded ball bearings on the rear of the spindle operate in a continuously circulating bath of oil supplied by the pressure system.

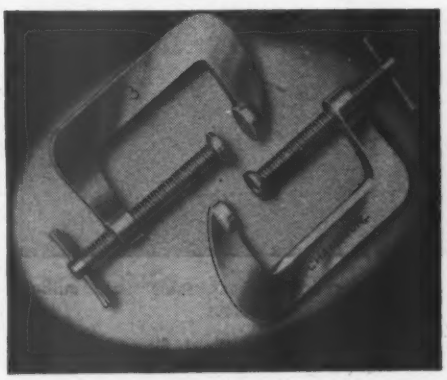
These surface grinders are available from the Mattison Tool Works, Rockford 1, Ill., in table sizes ranging from 12 in. to 36 in. wide by 36 in. to 192 in. long. The wheel head adjusts vertically between the table surface and the wheel to allow from 16 in. to 24 in., depending upon the size machine. Larger table sizes and additional wheel head capacity can be provided if desired.



The Mattison 24-in. by 96-in. surface grinder

C Clamps

Champion light-duty C clamps are manufactured with aluminum-alloy bodies for lightweight by the Western Tool and Manufacturing Company, Springfield, Ohio.



Champion light-duty C Clamps

They have sliding cross handles and heavy button tips for applying maximum holding

pressure. The clamps are available in five sizes with openings of 2½, 3, 4, 5 and 6 in. and corresponding depth distances of 1¾, 1⅞, 2, 2½ and 2¾ in. The three smaller sizes have 7/16-in., 14 threads, and the two larger sizes have ⅝-in., 11 threads.

Dual-Adjustable Face Milling Cutters

A carbide-tipped dual adjustable face-milling cutter, with the carbide tips positioned in a manner designed to permit the maximum use of the carbide, is manufac-

Carbide-tipped dual adjustable face milling cutter

tured by the O. K. Tool Company, Inc., Shelton, Conn. Negative axial and radial rakes are supplied for machining steels; positive axial and radial rakes are supplied for machining cast iron and non-ferrous material. Combinations of negative axial and positive radiol rakes or positive axial and negative radial rakes may also be had. Stock cutters are made with National Standard Drive; other drives on request.

Shapers with Rapid Traverse

The line of Cincinnati shapers comprises 26 machines in ten sizes built in five types. One of these types is the Railroad shaper which is made in two sizes, the 32-in. heavy duty and the 36-in. heavy duty. Both are rapid traverse shapers and are equipped with special features for work on driving boxes, crossheads, shoes and wedges, main-rod brasses, and other general repair work in railroad shops.

Two of the other types, the Rapid-Traverse shapers and the Universal shapers are each made in eight sizes from 16 to 36 in. The Universal shapers are identical with the Rapid-Traverse shapers except that they are equipped with the Cincinnati universal table. All have rapid power traverse to the table, automatic oiling, internal transmission, cam feeds, and direct-reading indicators. All speed and driving gears are entirely inside the column. Selective multiple cam feeds are located out of the way on the side of the column. Full length taper gibs with single-screw adjustments are used for all wearing surfaces, except the table support where a flat gib is used.

Levers for starting and stopping, for speed control, for engaging the power rapid traverse, for feed changes, for ram and stroke adjustment, and the shaft for elevating and lowering the rail may all be reached by the operator without leaving his working position. Direct-reading indicators which show the setting for feed, speed, and length of stroke may be read or changed while the machine is running or stopped. Only one wrench is required for adjusting the vise, tool-post screw, and various other clamping units used in making settings and adjustments.

The table used on the universal shapers revolves to any angle. It has one solid face similar to the box table on a standard shaper and one tilting face with an adjustment up to 15 deg. either way on an axis at right angles to the trunnion. Each movement is made by a crank wrench through a worm and worm wheel and all settings are indicated by graduations. With the swiveling vise work can be rotated around all three possible axis.

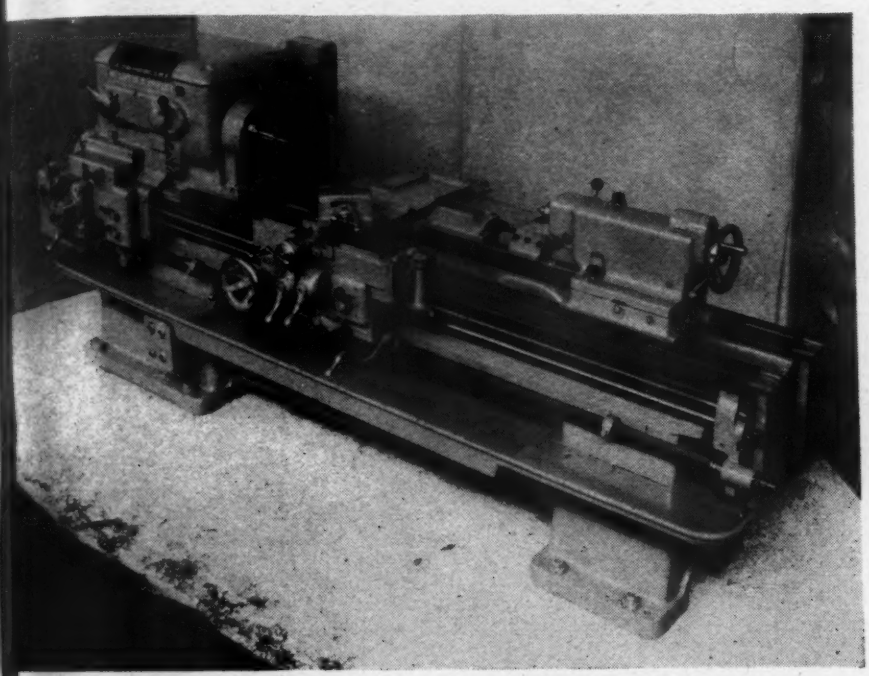
The power rapid traverse is actuated by a lever close to the operator's hand and operates for either direction. It instantly moves the work up to the tool for the cut, thus reducing the time between cuts. When the work piece is finished the table can be traversed quickly to one side so that the work can be loaded or unloaded without interference from the tool and post.

The remaining two types of machines in this group, manufactured by the Cincinnati Shaper Company, Cincinnati 25, Ohio, are the Utility shaper and the High-Speed shaper. The Utility shapers are made in two sizes, 16-in. and 20-in. and in two models, plain and universal. They are furnished with all of the features of the other four types of shapers with the exception of power rapid traverse of the table. The High-Speed shapers are made in two sizes, the 16-in. utility and the 16-in. heavy duty, and in two models, plain and universal. Speed ranges from 15 to 200 strokes per min.

The Cincinnati 24-in. heavy-duty shaper with universal table

Lathe Line Expanded

The line of lathes and turret lathes manufactured by the Lodge & Shipley Machine Tool Company, Cincinnati 25, Ohio has been expanded by extending the sizes of Model X lathes to include the 14-in. and 16-in. sizes. Both the 14-in. by 54-in. and the 16-in. by 54-in. selective head lathes have a 24-speed headstock available in three ranges of spindle speeds, and a totally enclosed quick-change gear box with finger-tip dial operation and automatic lubrication.



The Lodge & Shipley Model X 16-in. by 54-in. selective-head engine lathe

Another addition to the Lodge & Shipley line is the 2A Duomatic automatic lathe, a smaller model of the 3A Duomatic. This lathe is said to feature simplicity in changeover from one cycle to another, and to have numerous applications without special attachments. A simplified headstock provides spindle speeds ranging up to 2000 r.p.m. using a 30-hp. motor.

Equipment for Milling and Boring

A variety of products for boring, milling, drilling, tapping and facing are manufactured by the Giddings & Lewis Machine Tool Company, Fond du Lac, Wis. This line includes both machines and supplementary equipment. Among the latter group are rotary tables of the horizontal, universal and vertical types that index work for alignment, simplifying set-ups; a continuous-feed facing head which permits the turning of studs and trunnions, as well as facing, backfacing, boring, grooving and recessing; and angular milling attachments that perform many operations at right angles to the machine spindle.

Other types of supplementary equipment which increases the working range of Giddings & Lewis machines include arbor supports, micrometer measuring devices, fine and stub boring bars with adjustable block-type cutters, clamping and holding equipment, etc. A heavy-duty power-driven rotary table for floor-type machines often permits using a standard horizontal boring, drilling and milling machine to replace one or more special machines. The self-contained attachment may be used for indexing heavy unwieldy work having multiple surfaces to be machined.

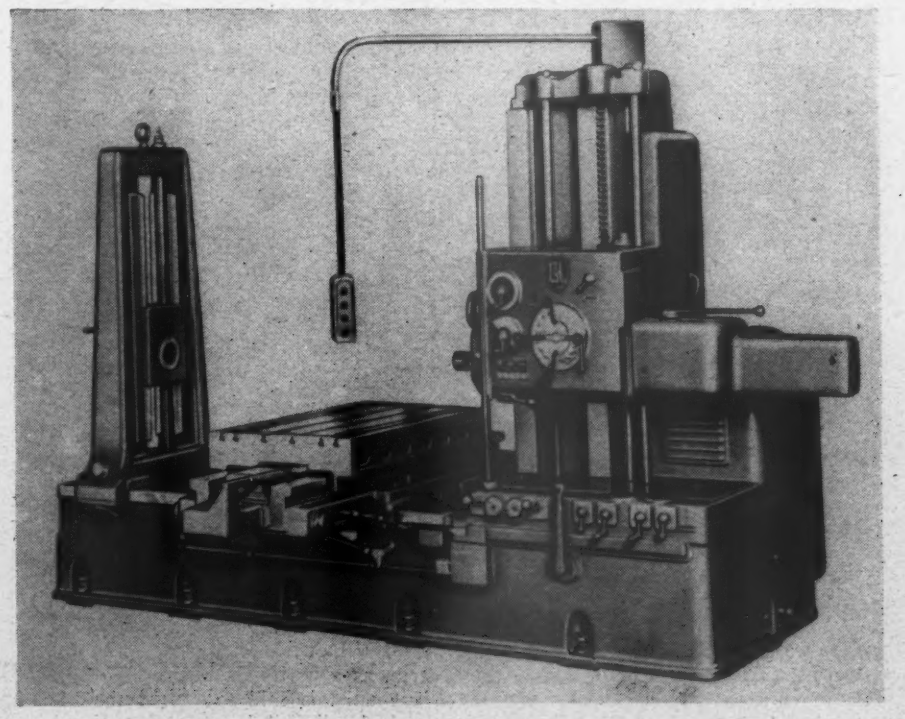
Independent rotary-table units are made in two sizes which support loads of 10 to 25 tons. Round, square and rectangular platens are available in several sizes. Rotary tables have 18 power feeds in either direction of rotation, and rapid traverse at maximum power. The table and base have a 4-ft. traverse on the runways, with longer runways available in increments of two feet. Power-driven rotary-table units can be set on floor plates or on an independent foundation.

Included among the Giddings & Lewis line of machines are the model 00-T and the model 300-T horizontal boring, drilling, and milling machines. The 00-T is for small work and accommodates work up to 18-in. cube in size and 1,000 lb. in weight. With the tracing attachment, it may be used for die-sinking work such as plastic and die-casting molds and hammer-forging dies. It may be employed for precision thread cutting when equipped with a thread lead device. In addition, it will handle a wide range of small-lot work requiring a high degree of accuracy, but where the expense of jigs and fixtures is not justified.

Driving gears on the spindle provide a substantial fly-wheel effect. All machine movements are regulated by electronic and mechanical controls in a convenient centralized panel.

The model 300-T handles work up to a 30-in. cube in size, and 8,000 lb. in weight. The working range may be made broader by employing rotary tables, continuous-feed facing heads, and other attachments and accessories. Built-in scales and verniers give readings to 0.001 in. for the headstock, table and saddle movements. The 300-T can also be equipped with a micrometer measuring arrangement reading to 0.0001 in., thus eliminating the need for toolmakers' buttons and other measuring instruments not included in the device itself.

For working in restricted areas, on parts which cannot be moved to machine tools, in repair of stationary machinery, and as an auxiliary unit for large work placed on floor-type horizontal boring, drilling and milling machines, the model 230 portable machine for boring, drilling, tapping, milling and facing has been developed. The cutter may be approached to surfaces in almost any location by means of the spindle travel, the up-and-down tilting of the head-stock, the vertical



The Model 300-T table-type Giddings & Lewis horizontal boring, drilling and milling machine

travel of the headstock on the column, the 360-deg. column rotation, and the horizontal column movement on the runway. The model 230 is not limited as to work size, provided that it can be placed in a suitable operating position. It can be moved by crane to the work, and may be operated inside vessels, tanks and large open-end workpieces.

Air-Tracer Lathe Accessory

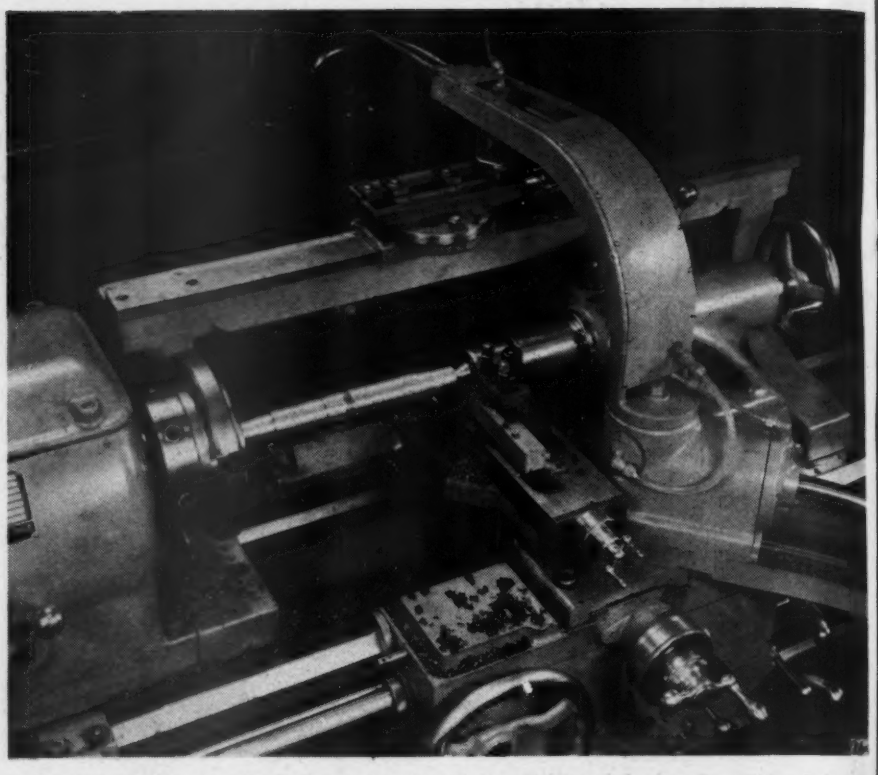
A lathe accessory which combines an Air-Tracer with a hydraulically operated power circuit to produce work pieces with contours matching those of a master template is available from the Monarch Machine Tool Company, Sidney, Ohio, for application to its 14-, 16-, 18-, or 20-in. toolmaker's or engine lathes. It may be used for any increasing-contour or multiple-diameter work, such as mandrels, punches, dies, spinning chucks, valves, metering pins, nozzles, impellers, molds, and step shafts. Diameters, tapers, square shoulders, necks, and radii on a step shaft may be turned in a single cut.

An example of the application of this unit to railroad work is reported in the turning of locomotive link pins. Two diameters, two tapers, and two necks are said to have been turned in a total time of 31 seconds. Overall machine and handling time was reduced by machining a pin on each end of a piece of bar stock of suitable length; a finish cut eliminates the grinding operation.

Thin-metal templates may be used because the pressure of the tracer against the template is only a few ounces. When certain types of straight shaft work are being turned, a master work piece, held between centers, may be used. The template is scanned by a spring-loaded air-tracer working on the air gauging principle. Air from a constant pressure source is supplied to the system through an orifice of such size as to maintain the proper air loading pressure of 35 lb. per sq. in. with the Air-Tracer in its balanced position. The design of the air tracer valve is such that a small amount of air is continually escaping to the atmosphere, a film of flowing air keeping the pressure in constant balance with no appreciable friction or pressure reaction.

Air loading pressure established by the air-tracer controls the operation of the tool slide through the hydraulic relay valve. With the Air-Tracer valve in complete balance the tracer operates with approximately five ounces of pressure against the template. While the tracer is scanning a straight section of a template the balance of the air loading pressure is not disturbed and the tool slide is locked in position by an equal amount of pressure on both sides of its actuating piston.

The slightest change in template shape increases or decreases the air loading pressure by changing the rate of flow from the air-tracer valve. Instantly, the amount of tracer movement from its balanced position is amplified into hydraulic-relay-valve motion in a ratio of 1 to 100. Air loading pressure is again restored to balance as the tool slide moves in the direction and to the extent of the template variations.



A Monarch Model C engine lathe equipped with the Air-Tracer turning locomotive link pins

Actuation of the hydraulic relay valve is through the medium of a flexible metal bellows. The bellows breathes during air pressure variation, causing it continuously to balance in a position determined by the air loading pressure. As the hydraulic relay-valve stem is attached to the free end of the bellows, movement of the valve will likewise be such as to correspond to the air loading pressure.

The lathe carriage is moved by the usual power or handwheel feed, and the tool follows a path relative to the work which is the resultant of the movement of the carriage and the hydraulically operated tool slide. The position of the template support is adjustable along the rail. A micrometer adjusting screw is incorporated to permit longitudinal adjustment of the template. The swiveling base of the template support allows initial setting of the template for parallelism with the lathe centers to be accomplished by using the Air-Tracer to check the accuracy of the final setting.

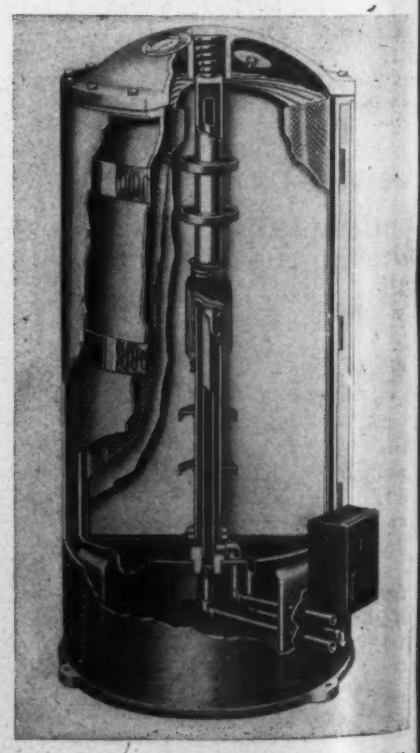
Purification and Clarification Units

The Honan-Crane Model 610 purifying unit is a direct-connected continuous oil purifier employing diatomaceous clay as a filtering medium. A product of the Honan-Crane Corporation, Lebanon, Ind., the unit was developed for the purification of the oil in hydraulic presses and machines.

The model 610 is 7½ in. in diameter and 15 in. high, with a capacity of one gallon of oil at a clean color flow rate of 5 to 15 gallons per hour. The purifier employs 4½ lb. of Cranite, specially processed fullers earth, as a purifying medium. The use of these units is said to extend the life of the hydraulic oil by removing abrasives, products of oxidation, casually introduced dirt and oil-soluble contamination which are removed as rapidly as they are formed or enter the system. The refills are reported to last four to six months.

The Honan-Crane clarification unit is known as the T-type clarifier and is used to extend the efficiency and life of soluble oil coolants. It is 33 in. high, 15½ in. in diameter, and contains a replaceable woven-fibre filter tubing.

The unit is direct-connected to the sump and circuit lines of the machine, operating on the machine's own pressure system. By

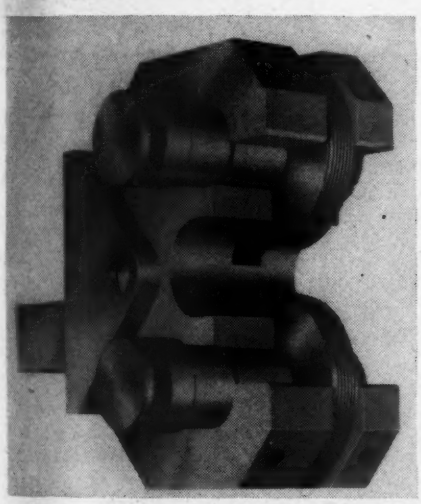


The Honan-Crane T-type clarifier for soluble oil coolants

means of a four-tube assembly in which the coolant is passed through the woven-fibre filter tubes and fine-mesh screens at 10 gallons per minute, 95 per cent to 98 per cent of the abrasives and solids are claimed to be continuously removed from the circuit.

Straight-Thread Rolling Attachment

The Lanroll attachment for rolling straight threads is a method of generating screw threads that has been designed by the Landis Machine Company, Waynesboro, Pa., for application to practically all standard makes of automatic screw machines and turret lathes. This attachment processes threads which otherwise would have to be handled as a secondary operation because of shoulder interference or inaccessible positions for die-head threading in the normal manner. It completes the work on the same chucking for closer tolerance between the thread and other sections of the work piece, and it permits the thread rolling operation to be performed at the



The Lanroll attachment for rolling straight threads on automatic screw machines and turret lathes

same work speeds employed for other machining operations.

The attachment is primarily a single-purpose tool, and for use on automatic screw machines must be designed for any one particular diameter, pitch, form and length of thread, as well as for the machine on which it is to be used. Application to standard automatic screw machines having tool slides is made by designing holders or shanks for the particular make, model and size of machine on which the attachment will be used. The attachment is engineered in accordance with tool-slide movements, adjustments, etc., as shown in the makers' manuals.

Lanroll attachments are engineered to use the largest possible roll diameters and size of attachment in relation to the thread size and pitch, and for application to the particular machine on which they are to be used. The thread length which can be rolled is limited to one-and-one-half times the thread diameter or less. The rolls are manufactured individually, and individual rolls can be obtained by specifying the number of the roll required, the thread diameter, pitch and form, with the size and serial number of the attachment.

A Hydraulic Universal Grinder

A Filmatic 10-in. hydraulic universal grinding machine, announced by Cincinnati Grinders, Incorporated, Marburg avenue, Cincinnati 9, Ohio, is available in the 24-in. length as a precision tool-room grinder or a precision production grinder with universal features. The main-wheel spindle is mounted on Filmatic bearings, which consist of bronze-lined steel segments, pivoted to allow the entrance of wedge-shaped oil films. These films develop high pressures between the segments and spindle to maintain accurate dead-center rotation of the spindle under any rate of stock removal.

A hinged internal grinding unit at the front of the wheel head remains in place during conventional traverse or infeed grinding operations. Being individually driven from a 1-hp. motor, the internal unit may be set to grinding position by swinging it down and bolting it to the fror of the wheel head with two bolts. Witl the standard quill and wheel, the recommended internal grinding capacity ranges from ⅞ in. to 1½ in. diameter by 2½ in. deep. Other quills are available for holes ranging up to 3 in. deep, and extra wheels range from ¼ in to 1¼ in. diameter.

The headstock is driven by a ½-hp. d. c. motor mounted on top of the unit. A flat belt transmits the power from the motor directly to a pulley mounted on the spindle near its front end. There are no gears, worms, cone pulleys or other driving elements within the unit. Speed changes are effected through an electronic control unit built into the headstock which converts a.c. into d.c. Rotation of the small plastic control knob on the headstock changes spindle speeds through its complete range. Individual speeds are indicated in a small window next to the speed-change knob.

Live- or dead-spindle work drive may be selected through a lever control at the front of the headstock. This lever is pinned to a threaded stud which operates a self-centering brake on the spindle. A jog button incorporated in the headstock electrical circuit, permits the operator to stop the face plate or chuck in the most advantageous angular position for loading and unloading the work. The spindle nose conforms to Lathe Standard No. 5, so that standard chucks can be applied without resorting to adapters. To accommodate draw-in collet equipment, the spindle is bored to a modified No. 14 Jarno taper. A conventional taper collet reduces this to a standard No. 7 Jarno taper for the center.

All table controls are at the left, and all cross-traverse controls at the right of the operator. Electrical control buttons are directly in front of him, built into an inclined panel. The manual table traverse is through a two-speed mechanical arrangement, at the rate of 1 in. and 1/10 in. per revolution of the handwheel. The power table traverse is hydraulically actuated, infinitely variable from 3 in. to 280 in. per min., and controlled with a selector knob below the handwheel. Tarry at reversal may be adjusted from 0 to 5 seconds. The table traverse, with automatic reversal, may be set for strokes as short as 1/16 in. At any length of stroke, and at any rate of traverse, the table is said to trip consistently within an accuracy of .001 in.

Coolant flow and headstock spindle rotation automatically start and stop with the table traverse. One of the electrical control buttons separates these three simultaneous actions into individually controlled functions if desired. The grinding-wheel-spindle bearings, table ways, and cross ways are automatically lubricated.

The pick-feed mechanism, in the cross-feed unit to the right of the operator, is built in. The rate of pick feed, indicated by a dial, may be selected instantaneously

The Cincinnati 10-in. universal hydraulic grinding machine

through a knob control. An internally mounted trip-out dog stops the pick-feed action approximately .001 in. before the cross-feed micrometer dial reaches its zero graduation. Final sizing is then accomplished by rotating the handwheel to a positive stop, which is engaged and disengaged as desired by moving a small lever. The pick-feed cycle is then repeated by pushing a starting knob. Sizing adjustments are in increments of .0001 in. of diameter reduction.

The footstock has lever retraction of its spindle. It features adjustment of the spring for correct pressure of the center against the work, and two sets of three-segment bearings retain alignment. A diamond truing bracket with micrometer adjustment is mounted on the footstock.

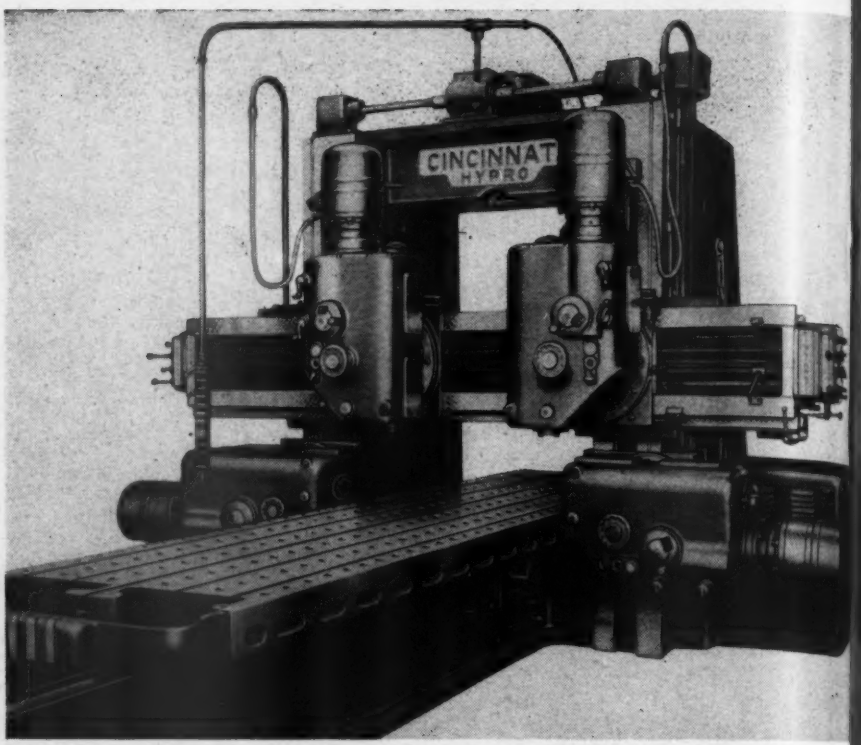
The motor for the grinding-wheel spindle, rated at 1½ hp., transmits its power through two matched V-belts. Two-step sheaves, with a safety device to prevent new wheels from being mounted on the spindle when running at the high speed, are included to restore wheel efficiency at about the half-way point of being worn out.

Two types of production infeed equipment may be built into the machine. Hand hydraulic infeed is installed on machines used primarily for conventional universal grinding operations. It offers a hand-controlled infeed feature for moderate quantities of work. Automatic infeed is furnished for shops requiring a combination of universal features with production infeed features. Conventional universal work can be handled on this machine just as with the basic type. In addition to these two built-in features such attachments as quick-change adapters for the face plate and chuck, two types of draw-in collet equipment, either handwheel or lever operated, double-end shaft motor, and radius-truing attachments are available.

Planer-Type Milling Machine

The 48-in. by 48-in. by 12-ft. Cincinnati Hypro planer-type milling machine features the Cincinnati Hypro electronic head and table drives, with which head or table feeds can be increased or decreased while cutting as may be determined by the work piece through conveniently placed direct-reading speed-control dials mounted in the operator's pendant station. From the centralized movable pendant station it is possible to change from feed to traverse, increase or decrease feeds without gear changes, clutches, etc.

Engagement of the side-head feed or traverse is through push-button magnetic-type control. It never becomes necessary for the operator to leave his normal working position to change speeds, feeds, or to start and stop head or table movements. An automatic spindle-load control with feed tachometers is an added feature to aid productive capacity. Feed rates are automatically changed to suit surfaces of various widths to maintain constant horsepower so that the full capacity of the machine will be utilized at all times. The transmission of power to the table is through the newly designed Cincinnati Hypro combination herringbone and cone worm-wheel drive, providing an anti-backlash, self-locking unit without side thrust. These features will permit the machining of irregular contours not readily machined on a conventional planer miller.



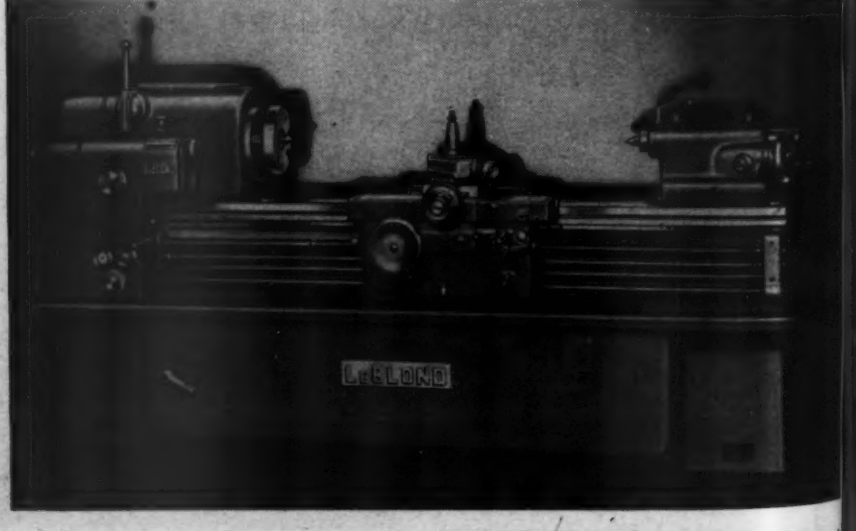
Cincinnati 48-in. by 48-in. by 12-ft. Hypro Electronic planer-type milling machine wi two 8¾-in. quill rail heads and two 8¾-in. side milling heads

In this product of the Cincinnati Planer Co., Cincinnati 9, Ohio, newly designed Hypro dual-purpose milling heads are incorporated to provide the necessary speed and power for using both high-speed and carbide-tipped milling cutters on all classes of work.

Lathe with Single-Lever Control Head

The 16-in. Model RT heavy-duty lathe with single-lever-control head, manufactured by the R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio, offers 16 spindle speeds, many of which are in the carbi range. The 16 spindle speeds, rangi from 20 to 1,025 r.p.m. or from 30 to 1,5 r.p.m., are all shifted by a single lev fitted with a guiding arrow which work in connection with a direct-reading plat A universal power rapid traverse move the carriage, cross slide and tailstock ele trically. A single lever on the apro controls all movements of the carriage an cross slide, and a plunger on the carriag picks up the tailstock and pulls it in eith direction.

The single-lever-control headstock mod contains a combination gear and belt driv with hardened and ground steel gear throughout. The spindle is mounted in tw tapered roller bearings and one straigh roller bearing. The quick-change box i totally enclosed, built with heat-treate gears mounted on anti-friction bearing



The LeBlond Model RT 16-in. by 54-in. heavy-duty lathe with single-lever-control headstock

and provides 60 changes of feeds and threads. The L-shape bed extends under and supports the entire headstock base; it is fitted with replaceable flame-hardened and ground steel bed ways.

The spindle start, stop, and reverse are controlled either from the apron or the headstock. The lathe has five control and drive rods, including a feed reverse rod with single automatic length stop in each direction. Lubrication is automatic in the headstock, feed box, and apron.

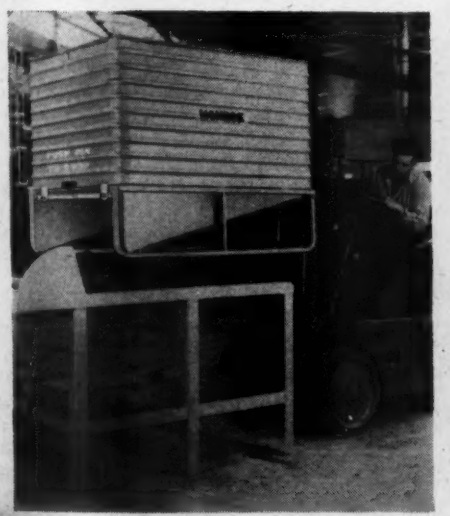
The second version of the Model RT lathe has a variable-speed headstock which offers a virtually unlimited number of spindle speeds ranging from 6 to 1,500 r.p.m. This version has hardened and ground steel gears throughout the headstock, a universal quick-change box which is totally enclosed and automatically lubricated, and a combined feed apron with a positive-jaw feed clutch. This version is built and equipped with many other features in common with the single-lever-control headstock model.

Drop-Bottom Skid Box

An innovation in material-handling equipment, which minimizes the manual emptying of steel boxes and tubs filled with small parts and is said to save over 20 per cent in shop-handling costs, has been announced by the Monroe Auto Equipment Company, Monroe, Mich.

Known as the drop-bottom skid box, the unit accomplishes the emptying job by gravity through a hinged bottom supported by two heavy, removable pins. The contents of the box, forgings, castings, stampings, screw machine parts or other small parts, may be unloaded to the floor or worktable without the necessity of the worker reaching into the box, bending over to the floor of the box on the inside, or performing other time-consuming waste motions.

The boxes, which may be used with ordinary lift trucks, are constructed of corrugated hot-rolled steel, and, are available in six sizes with capacities ranging from 1,500 to 4,000 lb. Each box is equipped with skids for floor unloading. Offered separately as companion equipment are stands to hold the boxes at a height of 41 in. and provide handy waist-high worktables to hold materials released when the boxes are emptied. These stands, constructed of heavy-duty angle iron, are supplied in sizes built for tiered loads from 4,500 to 12,000 lb.



Monroe drop-bottom skid boxes for small parts

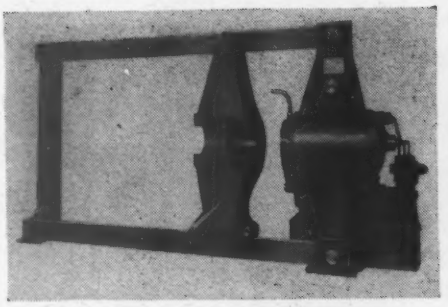
Hydraulic Wheel Presses

Fully Oil-Hydraulic wheel presses for forcing locomotives drivers and car wheels off and on axles are currently offered in 25 new standard sizes by the Watson-Stillman Company, Roselle, N. J. Capacity ranges from 100 to 800 tons. The machines are individually powered by fully oil-hydraulic pumping units, which incorporate in the same circuit features of rapid traverse formerly actuated by weighted pull backs or by shop air pressure.

The machines may readily be adjusted both as to pressure and length of stroke. A single lever controls all portions of the cycle, and is hooked up to a positive safety latch to guard against damaging over-strokes. Change from rapid approach to pressing speed is automatic upon contact. All models are of the inclined type, but can be furnished with an offset beam for handling the work by hook and trolley where overhead crane facilities are lacking or inadequate.

To withstand the heavy tensile stresses encountered in repair-shop mounting and demounting work, both the cylinder beam and the resistance beam are of cast steel, held together and aligned by rolled machinery steel tie-bars. A machined surface on the top face of the lower bar is a track for the resistance beam which bears, in the fixed position, against pins of heat-treated alloy steel. The resistance beam gap is slotted to receive a filler block when a solid abutment is needed. For maximum resistance to heavy compressive loads the main ram is of cast iron, smooth turned and polished.

Power is supplied by a radial-piston pump directly coupled to a constant-speed electric motor. The tank is composed of weldments, has an air breather, an oil-level gauge and access covers, and is the base for the motor and the pump. The entire pumping unit is securely bolted to the cylinder beam. No base plate or pits are required.



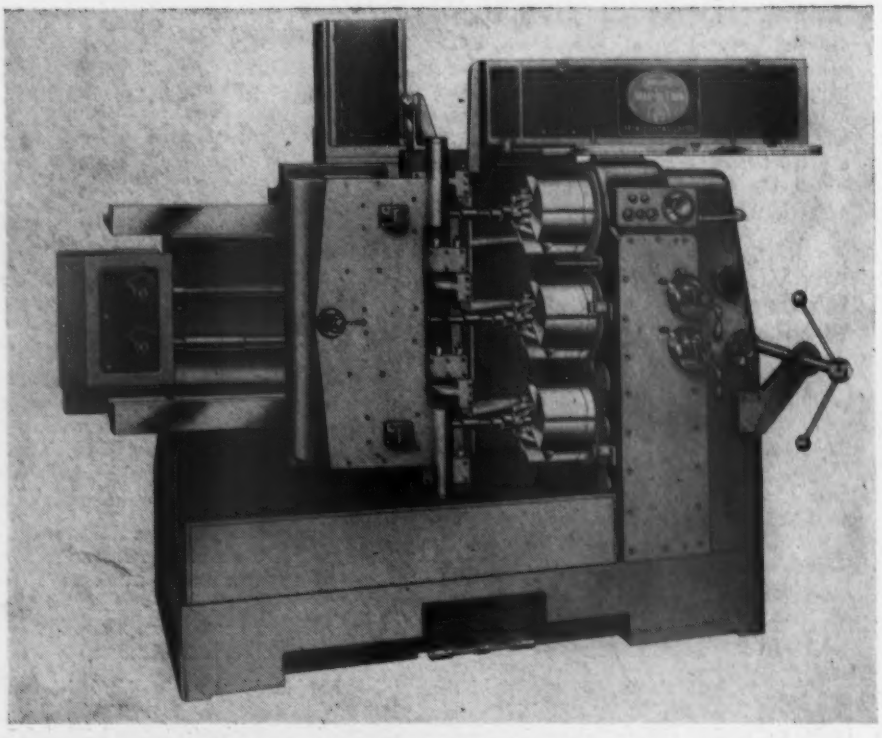
The Watson-Stillman oil-hydraulic wheel press

Three-Spindle Horizontal Lathe

The Model 30 Man-Au-Trol horizontal lathe is a three-spindle machine which is operated automatically through 39 different functions by the Bullard Man-Au-Trol Control at spindle speeds up to 1,200 r. p. m. Tools are mounted in a vertical plane on a slide in back of the vertical plane in which the three spindles operate. This permits complete accessibility to the work and allows chips, broken into short lengths by a special device, to drop out of the way with the coolant.

While multiple tools can be brought automatically into action in this product of the Bullard Company, Bridgeport 2, Conn., either one after another or simultaneously, one tool may be used for several different cuts, giving increased accuracy because of reduced deflection of the work.

The horizontal lathe, which weighs about 20,000 lb., provides great rigidity and permits a maximum drive up to 75 hp. It is equipped for complete manual as well as automatic operation. The movement of a single lever puts the machine under manual control for a different piece without disturbing the set-up for automatic operation.



The Bullard Model 30 Man-Au-Trol horizontal lathe

Sixteen feeds from .0003 to .0156 in. per revolution with 40 speeds from 50 to 1,200 r.p.m. are available along with semi-automatic loading and unloading. Angular or taper turning is achieved by combining the vertical and longitudinal feeds. The Man-Au-Trol Control does away with delays for measurements, sizing, and other similar functions customarily performed by the operator and keeps the machine at work continuously. Tool wear is quickly compensated for through a micro-adjustment that is part of the set-up mechanism.

Knee-and-Column Milling Machines

A line of knee-and-column type milling machines, incorporating features for handling heavy milling operations, has been announced by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. These machines, known as Dual Power and High Power Dial Types, are built in No. 5 and No. 6 sizes. The high-power dial types, available in plain, universal and vertical styles, are driven by 25-hp. motors. The dual-power machines are driven by 40- or 50-hp. motors, and are built in plain and vertical styles.

These machines are designed for shops requiring ample power for taking heavy cuts on large work, and where both high-speed steel and sintered-carbide cutters are used. Square-gibbed bearing ways on the column and top of the knee, a yard-wide knee to support the saddle, and a rectangular overarm with a built-in vibration damper and full-length taper-gib clamping are features of the construction.

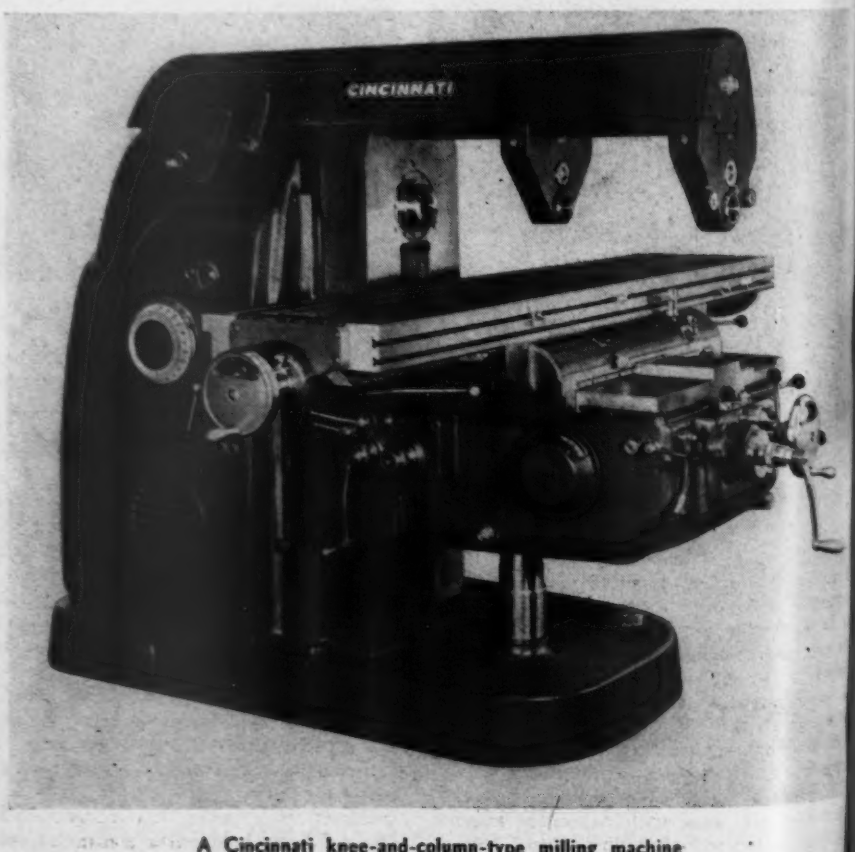
The dual-power machines have two ratings for the horsepower available at the spindle. For example, those wired for a. c. electrical equipment have a 50-hp. motor which can deliver its full capacity while the machine is running at any one of 18 spindle speeds from 45 to 1,400 r. p. m. Through automatic controls within the column, 25 hp. is delivered at the six low spindle speeds of 14 to 37 r. p. m.

The 24 spindle speeds and the 32 feeds from ¼ in. to 60 in. per minute are changed by power with a single four-position lever having both "increase" and "decrease" positions. To increase the spindle speed, the operator holds the lever in the "speed increase" position. The speed dial at the side of the column rotates one complete revolution in about 10 seconds, stopping for an instant at each increment of speed increase. As soon as the speed desired registers with the button at the rim of the dial, the operator releases the lever. The proper gears are then in mesh, and the speed indicated will be obtained when the clutch is engaged. Quiet and positive meshing of gears is developed through a synchro-mesh arrangement which rotates the spindle drive gears slowly during the power-shifting position. If the dial should go one or two increments beyond the desired speed before the operator releases the lever, he merely shifts it to the "reverse" position and the dial then rotates in the opposite direction.

Feed rates are changed in the same manner. A large direct-reading dial at the left-hand side of the knee, protected by a cover with two window openings, indicates the feed rates. Live rapid traverse is available for the table, cross, and vertical movements, at the rate of 150, 150, and 37½ in. per min., respectively.

The spindle drive clutch is engaged and disengaged hydraulically. A small finger-tip lever at the front of the knee, duplicated at the rear working position on horizontal machines, controls this function of operation. The clutch is a dry-plate unit accessible for adjustment outside the column.

Other features include automatic table feed cycles. Various combinations of feed and rapid traverse at the rate of 150 in. per min., with automatic reverse and return to the starting point, may be obtained through dogs on the front of the table actuating the feed plunger. The hand-



A Cincinnati knee-and-column-type milling machine

control lever for this plunger has four directional positions: feed and rapid traverse, right and left.

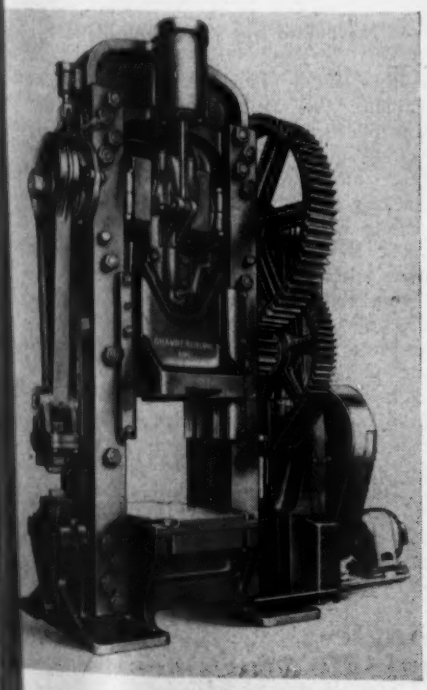
Like the table control, all other power-control levers are directional. Horizontal machines are equipped with a duplicate set of hand and power operating controls at the rear working position.

All electrical equipment is enclosed. Push buttons are built into the column, and electrical controls are built into a compartment. The motor, housed within the column, is mounted on a cradle to facilitate belt adjustment, and the cradle and motor can readily be removed as a unit when necessary to service the motor.

Cross and vertical hand-control cranks automatically disengage when their respective power feeds are engaged. All rotating parts and belts are enclosed, and the draw-in bolt is enclosed by a hinged cover. A safety switch at the rear of the machine automatically shuts off the current and stops the motor if the operator forgets to press the stop button before opening the hinged motor compartment cover.

Steel-Side Press

Chambersburg trimming press is designed primarily for forge shop use. It has patented forged-steel side frames tongued and grooved to bind the base and yoke into a



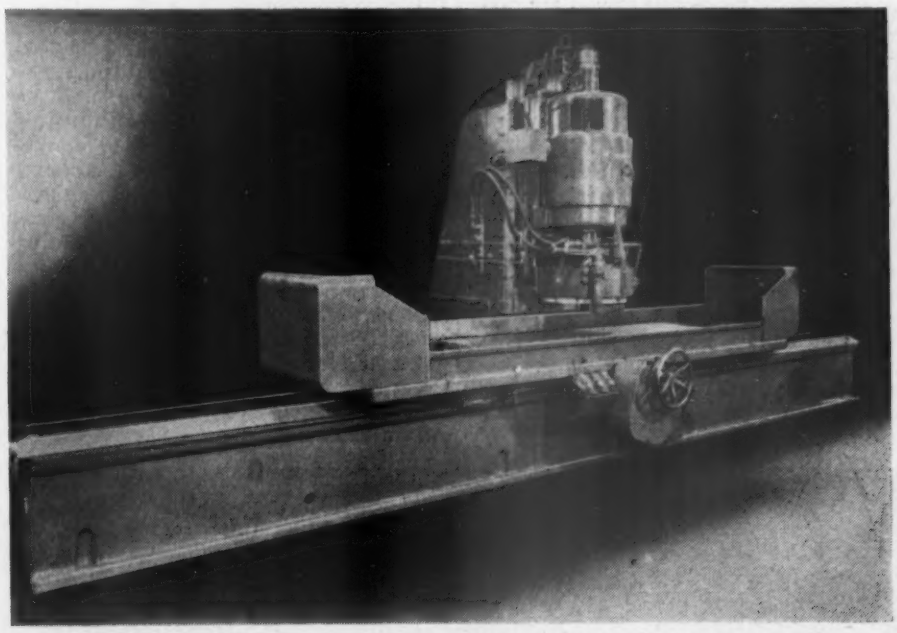
The Chambersburg trimming press

rigid unit. The forged-steel side construction plus a friction slip mechanism, which permits the flywheel to expend its energy at predetermined loads, is said to render the press practically unbreakable. The interlocking frame construction is designed to prevent sway and to insure rigidity, while the friction-slip mechanism prevents locking, jamming and breakage when the press is stalled through overload.

Accessibility to the front and back of the press has been attained by arranging the flywheel and gearing at the side of the press. This trimming press is furnished in single-crank and double-crank models by the Chambersburg Engineering Company, Chambersburg, Pa.

Vertical Surface Grinder

A vertical surface grinder completely hydraulic in operation and with a reciprocating table 20 in. wide by 100 in. long is available from the Bridgeport Safety Emery Wheel Company, Inc., Bridgeport, Conn. The grinding head consists of a 26-in. Bridgeport sectional grinding wheel mounted on the flanged end of a forged alloy-steel spindle which runs in precision matched, pre-loaded, independently oil-lubricated ball bearings and is driven by a 50-hp. electric motor. Two adjustable coolant nozzles are mounted on each side of the grinding wheel and an additional supply of coolant is supplied through the hollow spindle.



The Bridgeport Safety Emery Wheel Company's hydraulic vertical surface grinder

The head is mounted on a heavy column with square gibbed ways hardened for wear. Counterbalancing of the head is controlled by a hydraulic system which is said to give added rigidity to the grinding operation. The vertical movement of the head is accomplished hydraulically at speeds ranging up to 30 in. per min. The grinding wheel can be rapidly brought down to the work and traverse speed reduced until contact with the work is made; then the automatic wheel feed is started.

The table is reciprocated by two single-acting hydraulic cylinders operated by an oil-gear pump and combination valve. A complete range of table speeds up to 200 ft. per min. is available for all types of grinding. The table rides in hand-scraped vee and flat ways which are arranged for force-feed lubrication. The oil is supplied from a separate tank through a filter and pump; a pressure control is used to attain constant volume.

This grinder can also be furnished with a new electronic sizing device, with which the operator makes a few settings on a control unit, starts up the machine, and the grinding cycle is completed automatically when the required surface dimensions are reached. At the completion of the cycle, the table stops at the loading position.

Low-Temperature-Type Welding Rods

Seven new and improved welding rods of the company's low-temperature-type, two for gas and five for arc-welding applications, have been announced by the Eutectic Welding Alloys Corporation, 40 Worth street, New York 13. Known as EutecRods for gas, and Eutectrodes for arc welding, the group has been designed for railroad production and maintenance work. The rods utilize a principle of surface alloying at low base metal heat with high physical properties.

Some representative rods include the EutecRod 14 FC with a bonding temperature of 950-1,400 deg. F. and a tensile strength of 48,000 lb. per sq. in. These rods are said to produce strong, machinable welds for repairing drive wheels, cylinders, and other cast-iron moving parts that require the maximum physical properties. Each rod is flux coated to assist the filler-metal deposit at low base-metal temperature and to improve the physical properties of the weld.

Eutectrode 24 AC-DC rod has a tensile strength of 50,000 lb. per sq. in. In applying the rod no preheat is required, except where unusual or complex castings are to be welded, in which case preheating to 240 deg. F. is helpful. This rod may be used on either a.c. or d.c. arc welding.

The Eutectrode 60 AC has a tensile strength from 64,000 to 72,000 lb. per sq. in. and was designed for arc-welding bolsters, body bracers, sills, plates, spring planks, truck sides and other parts made of mild or low-carbon steel. The Eutectrode

660 DC and the Eutectrode 66 AC have a tensile strength from 68,000 to 75,000 lb. per sq. in. Both rods are for arc-welding parts made of medium alloy steels. The Eutectrode 670 DC and Eutectrode 67 AC have a tensile strength from 82,000 to 88,000 lb. per sq. in. They were designed for arc welding high-alloy steels, such as locomotive frames.

For adaptability in milling various metals and in using all types of cutting tools, four standard feed and six standard speed ranges are available. The feed range runs from ½ to 20 in. per min. in the smaller models to ⅜ to 90 in. per min. in the large models. Corresponding speed ranges vary from 35 to 1,400 r.p.m. to 50 to 1,250 r.p.m., and the driving horsepower from 3 to 50.

Knee-Type Milling Machines

A line of 32 knee-type milling machines, featuring automatic table cycle control, has been announced by the Kearney & Tracker Corporation, Milwaukee 14, Wisc. Designed and built in plain and vertical styles, these automatic-table-cycle models are said to combine effectively the advantages of both knee-type and production-type milling machines. They may be obtained for either manual or automatic cycle operation, depending on the requirements of the job.

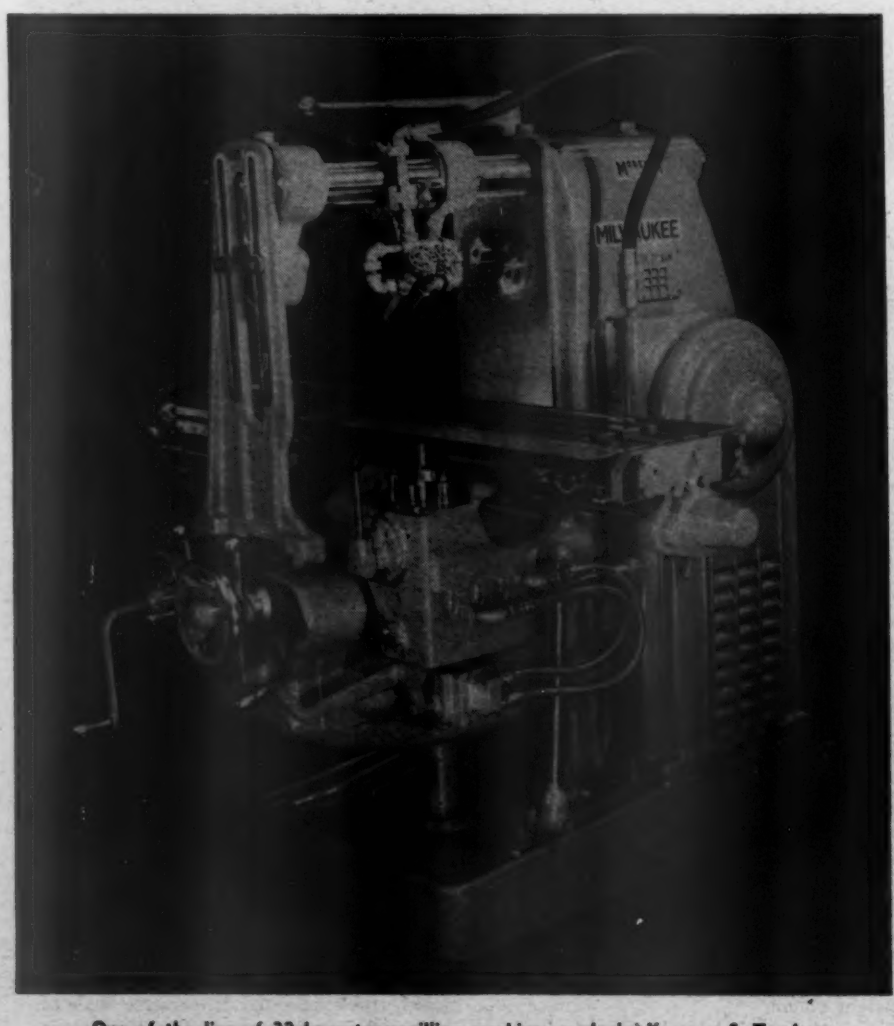
The machines have a six-way power rapid traverse with the spindle stopped or running, and a single-lever directional control for engaging the table feed or the rapid traverse. A pull-out plunger automatically controls the table reversal movement from rapid traverse reversal to feed reversal. Other equipment includes positive table screw feed with an adjustable nut-backlash eliminator, and single-shot, metered lubrication for the table and saddle ways drawn from a separate saddle reservoir.

Mild-Steel Electrode

Improvements to its Airco No. 312 electrode, an all-position, mild-steel electrode designed to produce weld metal possessing good mechanical properties and low hydrogen content, have been announced by the Air Reduction Sales Company, 60 East Forty-Second street, New York.

The improved Airco 312 electrode has two advantages over its predecessor. It can be used on a. c. and d. c. reverse-polarity current with operating characteristics equally good on either current. Preheating is no longer required to obtain porosity-free weld deposits. These deposits can be obtained by using either the stringer-bead or the full-weave technique.

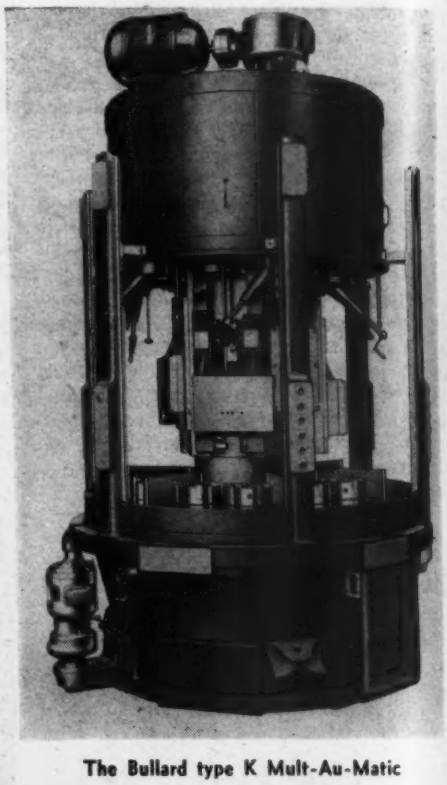
According to the manufacturer, the recommended uses for the improved Airco 312 are welding high-sulphur, free-machining steels, welding hardenable steels where no preheat is used, welding cold-rolled steels which normally exhibit excessive porosity when welded with conventional electrodes, and weldments to be vitreous-enameled after welding.



One of the line of 32 knee-type milling machines made by Kearney & Tracker

Multiple-Spindle Machine

The Type K Mult-Au-Matic of the Bullard Company, Bridgeport 2, Conn., is a high-speed development of the standard



The Bullard type K Mult-Au-Matic

multiple-spindle machine tool. It makes available the Mult-Au-Matic production principle in units with six, eight, twelve or sixteen spindles operating at speeds up to 900 r.p.m. The type K has semi-automatic chucking and adjustable stroke of slides for varying work heights.

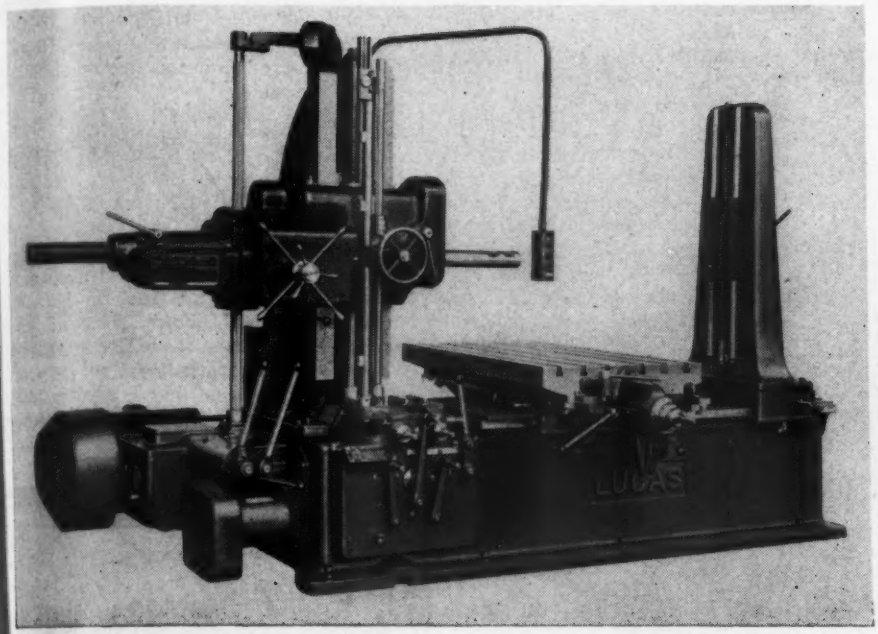
The 15-ton six- or twelve-spindle model offers speeds from 100 to 900 r.p.m. The 21-ton eight or sixteen-spindle machine offers 98 to 883 r.p.m. The Type K Mult-Au-Matic has 41 speed changes and 82 rates of feed available, with selective feeds and common speeds at all stations for high-speed output.

A foot control simultaneously closes the jaws and unlocks the indexing mechanism, thus leaving the operator's hands free. The work-holding device is released automatically at the unloading station.

Single-Spindle Machines

A line of single-spindle horizontal boring, drilling and milling machines is manufactured by the Lucas Machine Tool Company, Cleveland 8, Ohio. Among these machines is the Lucas 41, a standard 3-in. spindle machine with electrical pendant control for starting, stopping, reversing, and jogging. It, like other Lucas machines, has a high- and a low-speed range with a drive in the high-speed range directly through multiple vee belts so that there are no gears driving directly onto the spindle.

A second machine is the Lucas 460 which has a distance between the two out-



The Lucas "41" 3-in.-spindle horizontal boring, milling and drilling machine

side ways of 60-in. These outer ways are supported in a one-piece bed casting which also carries the two standard ways. The outer hardened-steel ways support the saddle and are equipped with hardened steel rollers.

The Lucas 460 is available with either electronic control or electric control. With the electronic control, all milling feeds in all directions and amounts are completely controlled, and combined where required, from the pendant. The electric touch system includes control over all movements of the head, spindle, table and saddle. The speeds and feeds of the machine are manually set, but the control of the movements is through a pendant control station which is movable to any position desired by the operator.

Hydraulic Band-Sawing Machine

The Marvel hydraulic band-sawing machine No. 15 employs a high-speed-steel endless band-saw blade 1½ in. wide and .072 in. thick with widely spaced teeth. A product of the Armstrong-Blum Mfg. Co. it will cut solids up to 15 in. by 15 in. in cross section.

The machine employs full hydraulic direct drive, hydraulic feed, hydraulic work clamping, and hydraulic end-gauge retraction. It has fully automatic bar feed or work push-up that provides fast travel for long material with automatic slow-down as the work approaches the end gauge or measuring stop. A torque-control valve automatically adjusts the feed pressure to hold a constant pulling load on the blade regardless of the size of work and regardless of the changing area or shape of the work as it is being cut off.

The torque-control valve is permanently set at the factory to load the blade at all times to its maximum point of efficiency consistent with expected normal life. The operator cannot, through ignorance, either slow the machine down below its highest efficiency, or overload the blade. His job is said to be little more than to "just push a button"; the machine does the rest of the job automatically.

Duplex Milling Machine

The Ingersoll 36-in. by 30-in. by 14-ft. duplex milling machine was developed to handle a variety of jobs in cases where there is not sufficient volume of any of the jobs to justify individual machines. It may be used for such operations as slabbing, channeling, slotting and edging locomotive side rods, machining new or refinishing old driving boxes, machining crossheads, shoes and wedges, guides, and link-motion parts.

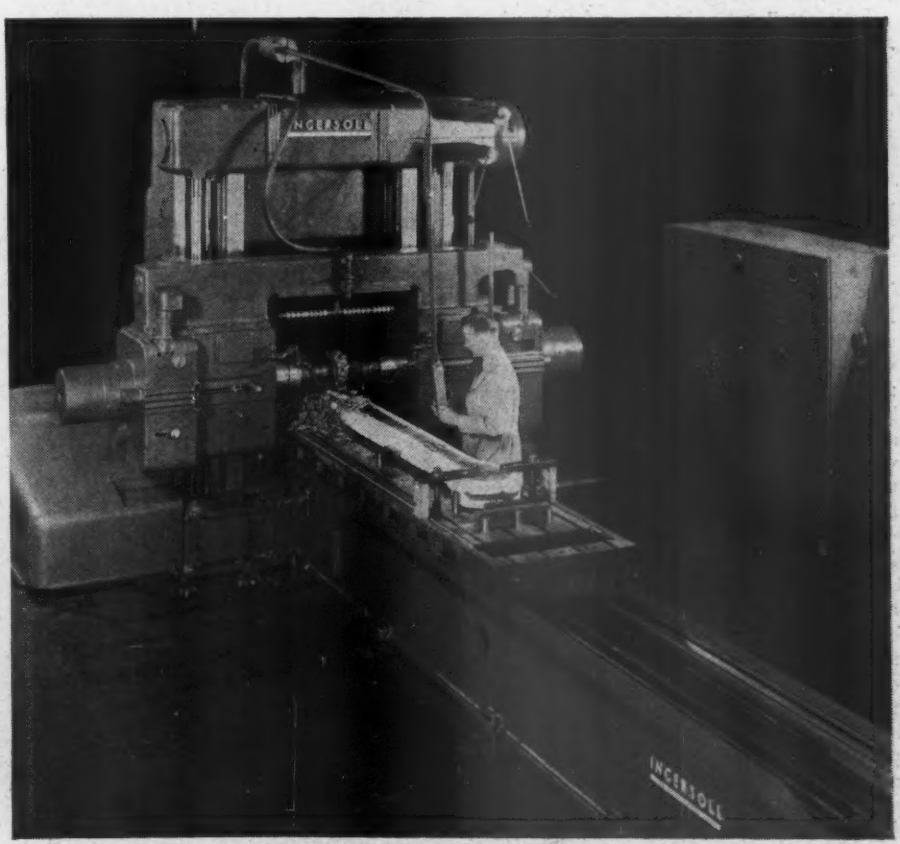
In this product of the Ingersoll Milling Machine Company, Rockford, Ill., the table and the head feeds can be connected so that the heads travel vertically in a definite ratio to the table movement, a feature specially designed for the milling of driving boxes. For ease in handling and operating there is a push-button pendant station by which the operator can start and stop the drive motor, stop, start, jog and reverse the table and rail, and vary the feed rates.

The distance between the horizontal spindles is 36-in., that between the table and the centerline of the spindles at their most elevated position 30-in. The working surface on the table is 14-ft.

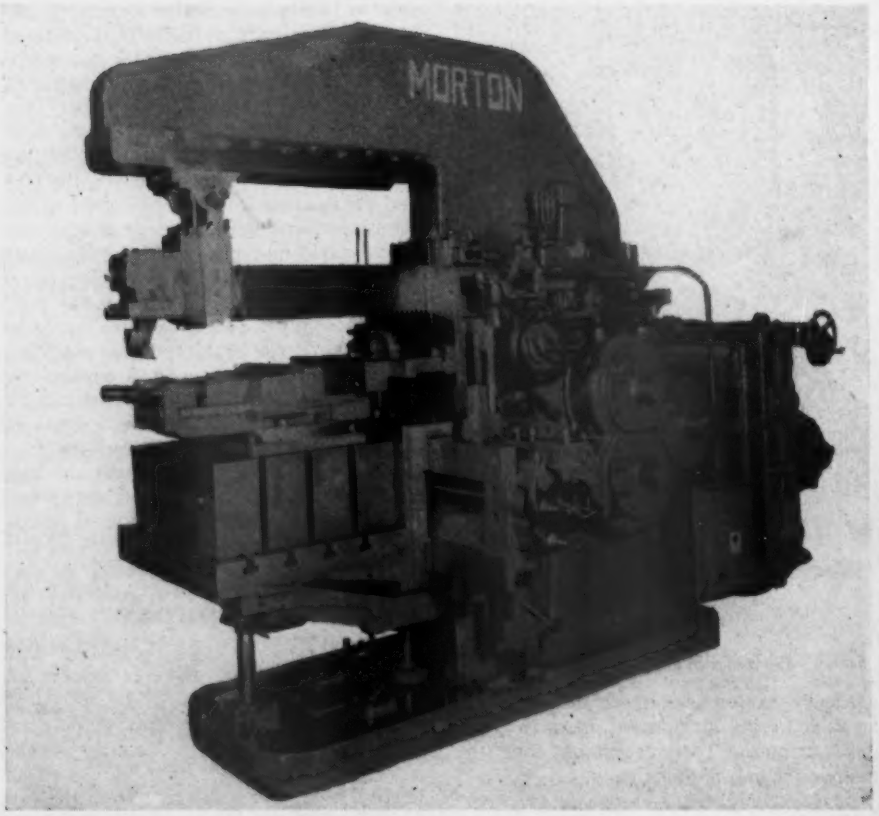
Draw Cut Shaper

The Morton 32-in. stroke high-duty draw cut shaper, with overhead ram support and a special heavy-duty shaper head, is built for either light- or heavy-duty shaping and planing. It has a 32-in. cutting stroke, a 32-in. horizontal or side feed, a 16-in. vertical feed, and a distance from the ram to the table when lowered of 30 in. A rectangular hollow-bored forged-steel ram 6 in. by 7 in. provides ample strength for deep cuts with coarse feeds.

Two elevating screws align the table and work at all times. Rapid power traverse and automatic feeds for both horizontal and vertical movement are incorporated. The gibbing to the overhead ram support and



The Ingersoll 36-in. by 30-in. by 14-ft. duplex milling machine



The Morton 32-in. stroke draw cut shaper

special shaper head allow quick adjustment. Automatic oiling is provided for all major moving parts. The shaper is powered by either a d. c. 7½-hp. or an a. c. 7½-hp. multi-speed motor, or by a 10-hp. constant-speed motor and control with a variable-speed transmission.

This draw cut shaper was developed by the Morton Manufacturing Company, Muskegon, Mich., for the machining of crown brasses, shoes and wedges, and miscellaneous parts used in locomotive building and maintenance.

Planer with Variable-Voltage Motor Drive

The 48-in. by 48-in. by 16-ft. Cincinnati Hypro double-housing planer is equipped with improved Cincinnati Hypro variable-voltage-motor drive which gives a wide range of table speeds for planing with high-speed or carbide-tipped tools. It has a speed indicator in the pendant station which reads in feet per minute and enables the operator to set his table speeds for the most efficient use of his cutting tools.

In addition to the high speeds necessary for modern planing, this planer has been recently redesigned to incorporate such mechanical features as positive magnetic-clutch-type quick-acting feed mechanism, narrow guide-rail construction, extended saddle supports, dual saddle and slide controls, inverted dovetail down slides, double cross and down-feed nuts, twin helical-gear drive, renewable tee slot inserts, etc., all of which are designed to contribute to a more rigid and faster-operating machine for the use of carbides as well as high-speed tools.

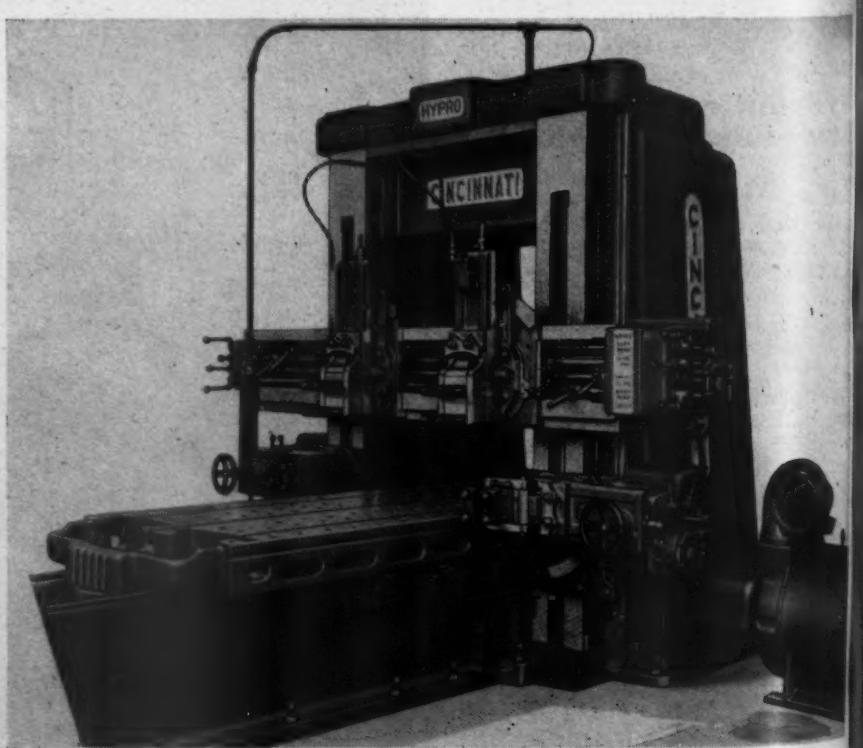
The new Hypro shockless tool lifters maintain uniform acceleration and deceleration with a soft reseating action of the tool block, which does not disturb the setting of the tool. The Hypro hydraulic safety table stop and jack is designed to stop the table quickly in case of control failure with a uniform decelerated motion without severe shock to the parts of the planer. A table jack incorporated in the hydraulic stops permits relocating the table over the bull wheel, during which operation the stop automatically resets itself. No cranes or other means are required to relocate the table.

The planer is a product of The Cincinnati Planer Co., Cincinnati 9, Ohio.

Safety Goggle

A rubber-frame safety goggle has been designed by the American Optical Company, Southbridge, Mass., for work in hot and humid atmospheres where chemical and dust hazards exist. It protects against chemical splashes, spray, foreign particles and exposures to fine dust concentrations. The frame is molded from non-irritating natural rubber to conform to the contours

The American Optical Company Super-Vent goggle has wide-angle vision and a replaceable lens



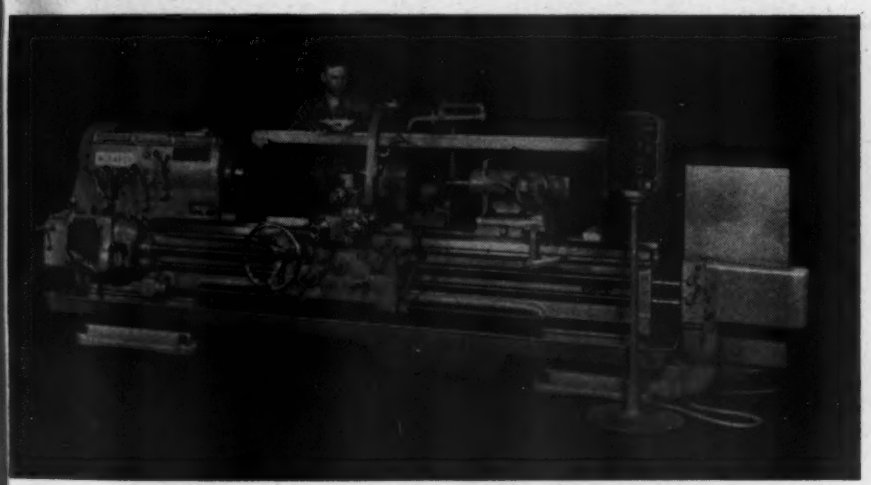
The 48-in. by 48-in. by 16-ft. Cincinnati Hypro Double Housing Planer with two rail heads and two side heads

of the face to make the fit airtight.

A feature of this goggle is a nosepiece containing an inhalation and an exhalation valve to prevent fogging and steaming of the lens. When the wearer inhales, the air sweeps through the chamber to remove moisture from the inner lens surface. When exhaling, the inlet valve closes and the moist air escapes directly through the exhalation valve.

Automatic Sizing

An automatic sizing unit has been developed by The Monarch Machine Tool Company, Sidney, Ohio, by means of which a standard engine or toolmaker's lathe can be converted from manual to automatic operation for such work as step-shaft turning, boring, facing, and contour turning, or any combination of them. This development in electronic-control equipment does not interfere with the normal functioning of the lathe nor are any of the features of the standard machine eliminated. The conversion from manual to automatic operation is said to take about one minute, while the set-up time varies from five to fifteen minutes; after the set-up, the operator merely loads and unloads.



Monarch lathe equipped with automatic sizing

On shoulders the tool rapid traverses out at 100 in. per min. to a stop to within any predetermined distance from the outside diameter of the next step. Feed for this diameter starts automatically at the predetermined feed rate. The machine will respond to a diameter change of as little as .001-in. At the end of the cut the tool backs away from the work, immediately following which the carriage rapid-traverses back to its starting position at the rate of 100 in. per min.

Size control is by means of diameter gauge blocks, micrometer gauge blocks or a template. They are mounted on a rail to the rear of and above the work center line, enabling the operator to make all set-ups from the front of the machine. Diameter gauge blocks are ordinarily preferred for work which will be repeated; otherwise the micrometer gauge blocks are recommended for most step-shaft jobs. A template is used by some for frequently repeated step-shaft work. If tapers or contours are to be formed, a template is required.

The automatic sizing controls are mounted on the right-hand end of the machine. Separate feed motors supply power for the length feed and the cross feed. Both of these motors are electronically controlled for constant feed regardless of load variations, and for a high degree of accuracy and finish over the entire length of the work piece. Both the length-feed range and the cross-feed range are ½ in. to 20 in. per minute.

A control stand which may be located at any desired point convenient to the operator at the front of the machine places continuous control at his fingertips. From this point he selects the length feed and cross feed during the set-up, and starts and stops the automatic sizing cycle. From the front of the carriage he may index the rear vertical turret bringing the desired cutting tool into operative position. The turning tool, mounted in the front tool slide, is so positioned that after return of the carriage at the end of each length cut, the tools mounted in the rear vertical turret are in the proper position for doing their work.

Automatic sizing is available on all Monarch 14-in. and larger engine and toolmaker's lathes. Application may be made on new machines at the factory or any of these lathes may be ordered arranged for the addition of automatic sizing later.

Hydraulic Flash Trimming Machines

Two sizes of hydraulically driven flash trimming machines for removing the flash or upset from resistance or butt welds are manufactured by the Morton Manufacturing Company, Muskegon, Mich. Both have an automatic operating cycle. The work is placed over the lower horn, and the foot starter stepped on. The upper ram unit automatically lowers and clamps the work. The rams trim on the draw cut, or inward stroke, and when completed the upper ram automatically lifts 1½ in. in the case of the smaller machine and about 2 in. in the case of the larger machine, after which both rams return to the outward position and stop. The operator can remove the work as soon as the machine starts unclamping and place another piece in trimming position.

The large size Morton hydraulically driven flash trimming machine

In either machine each ram has three or more tool holders, depending on the material thickness and analysis. Adjustable bit-type cutters of special design with a fine-pitch screw for cutter adjustment are used.

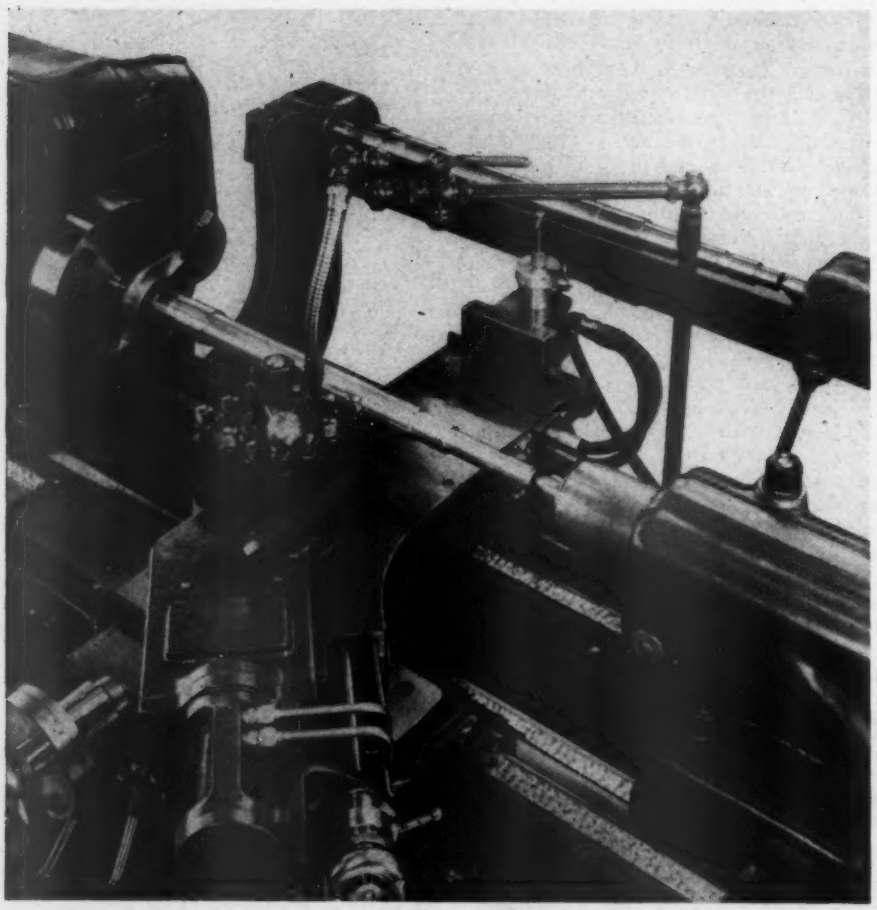
The larger machine is furnished in sizes ranging from 12 in. to 28 in. of trimming capacity and ¼ in. metal thickness. It has an operating distance approximating 55 in. from the center of the rams to the floor, which may be varied to suit customer requirements. This machine is arranged with a lower horn for circular work, such as wheel rims, cylinders or rectangles and will accommodate a minimum diameter of 9 in. The machine will handle either cylinders, rectangular or flat work up to ¾ in. maximum thickness.

The smaller size Morton flash trimmer is built in sizes from 8 in. to 12 in. of trimming capacity and ⅛ in. metal thickness. It has an operating distance approximately 40 in. from the center of the rams to the floor and can be provided for either flat strip or circular bands.

Hydraulic Duplicating Lathe

The American hydraulic shaft-duplicating lathe, built in 16-, 18-, 20-, 25-, and 32-in. sizes, is designed to reproduce circular shafts from either a template or an original workpiece by means of a hydraulically controlled cutting tool. From the template mounted on an adjustable holder attached to the rear of the bed, it will reproduce any round shaft regardless of length, number of steps, tapers, right-angle or tapered shoulders, recesses, grinding necks and radii.

To help in attaining accurate reproduction the flexible hydraulic connections have been kept as short as possible for more positive displacement of the fluid. To speed up production a four-way tool block in the tool slide for holding both the roughing and finishing tools may be used. Metal is cut at the speeds and feeds recommended for cemented-carbide tools. The metal is cut continuously with a single cutting tool without stopping to measure or caliper; measuring is confined to the first diameter only, after which all other diameters are secured automatically.



A small stepped shaft being reproduced on an American hydraulic shaft duplicating lathe using a work piece for a template

A choice of three speed ranges may be had in this product of the American Tool Works Company, Pearl Street at Eggleston avenue, Cincinnati 2, Ohio. The low speed range is from 15 to 1,000 r. p. m., the intermediate range from 23 to 1,500 r. p. m. and the high-speed range from 30 to 2,000 r. p. m.

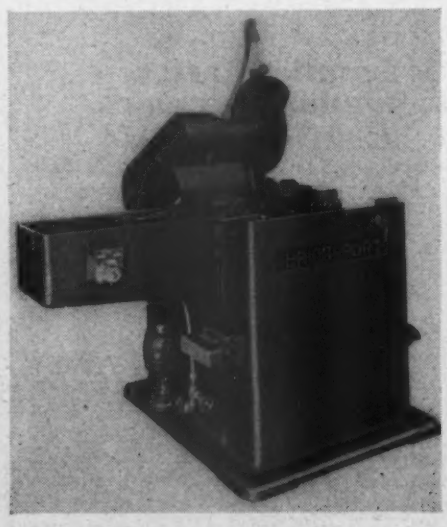
Automatic Cut-Off Machine

An automatic cut-off machine, completely hydraulic in operation, which handles stock up to 2 in. in diameter and will automatically cut off the stock in lengths up to 12 ft., is manufactured by the Bridgeport Safety Emery Wheel Company, Inc., Bridgeport, Conn. The cut-off head consists of a 16-in. cut-off wheel which is driven by a 10-hp. motor through a v-belt drive. The head is mounted on a rocker shaft with Timken bearings, which are fully sealed against grit. The coolant is supplied to both sides of the wheel through a nozzle which is complete with baffle plates and is adjustable to compensate for wheel wear.

The operating cycle of the machine is completely automatic. After the work is loaded, the operator trips a pilot valve and the work is automatically fed the required distance in the cutting position, gripped hydraulically, and cut off. This sequence is repeated automatically until stopped by the operator. Two adjusting valves are mounted on the front of the machine for regulating the rate of stock feed and the cutting cycle of the head.

A feature of this machine is the hydraulic feed of the cut-off wheel, which automatically compensates for changes in area when the wheel is cutting. In cutting a piece of bar stock, the wheel feed is much faster at the start and finish of the cut where the area is small than it is through the central part of the largest area of the piece; the wheel is always fed through the work at the limit of its cutting capacity.

All of the hydraulic valves are gasket-mounted on a manifold panel as a unit. This construction makes the maintenance and replacement of valves comparatively simple as they can be removed or replaced without disturbing any of the tubing or fittings. The piping runs from this panel to connective manifolds, allowing short tubing connections to the cylinders and also sealing off the hydraulic tank from the coolant and grit.



Hydraulically operated cut-off machine which is completely automatic in operation

Lathe with Electronic Controls

The Speedi-Matic is a hand-screw machine equipped with an automatic electronic system for selecting and controlling speeds and feeds which makes it possible to set up as many as nine different speeds and six different feeds for each job. Designed to handle small turning work in quantities of from 25 to 500 or more pieces, the machine has a stepless range of spindle speeds, both forward and reverse, from 50 to 5,000 r.p.m.

With the electronic speed and feed control both speed and feed remain practically constant as set, regardless of load variations. The higher motor torque available at the lower speeds and feeds permits full cutting-tool efficiency when taking heavy cuts on larger diameter work.

The control panel of the gearless, stepless, all-electric drive is always in full view of the operator. The feed and speed indicators enable him to select the correct speed and feed for each turret position and the correct speed for each cross-feed slide position. The power-feed ram-type turret permits the correct feed to be repeated for every piece in the lot. Each tool is presented to the work manually, power feed is applied to the turret slide, and at the conclusion of the cut the tool is withdrawn manually. The electronically controlled feed motor eliminates the need of a gearbox and makes available an infinite number of feeds within the entire range of ⅛ to 16 in. per min.

The machine features a self-centering ball-bearing, cut-off slide with front and rear blocks for holding tools. The tool on either block is presented to the work by manually operating a handwheel through 100 deg. or less. The tools are then hand-fed to do forming, necking, or cutting off of the work as may be desired. When the operator releases the handwheel at the end of the cut, the cross-slide automatically centers it for the turret tool clearance. Speeds may be selected in advance of use for both front and rear cross-slide operation the same as for turret tool operation.

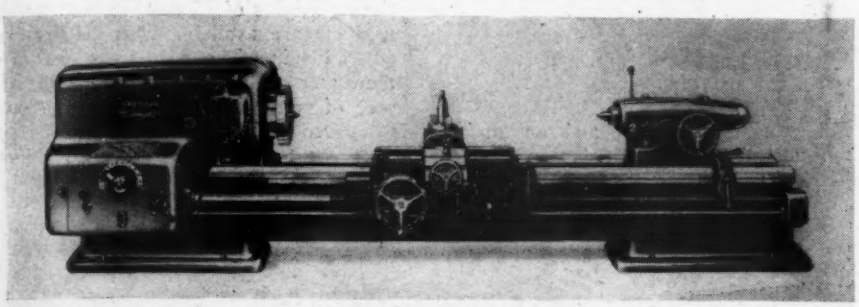
A hand-operated, air-fed, pusher-type collet attachment with constant air pressure on the barstock sufficient to feed stock through the collet to a stop on one face of the turret has been applied. By opening and closing the collet, the barstock is fed through it and held in position for the machining operations. Construction features of this lathe include flame-hardened and ground bed ways, hardened and ground anti-friction slides, and hardened and ground alloy-steel parts.

The Speedi-Matic is also available without the feed preselection feature, in which

case the feeds are from .0005 to .016 in. per revolution through a conventional gearbox. The power feed may also be entirely omitted. This hand-screw machine is a product of the Monarch Tool Company, Sidney, Ohio.

Lathe Designed for Carbide Tools

Pacemaker lathes are manufactured in five sizes ranging from 14 in. to 25 in. by the American Tool Works Company, Pearl street at Eggleston avenue, Cincinnati 2, Ohio. All models are designed for the use of cemented-carbide cutting tools and are available with a choice of three-speed ranges. Each range has 18 or 27 spindle speeds to provide suitable cutting speeds for all classes of lathe operation.



The 25-in. Pacemaker lathe

The spindle has three bearings, precision roller bearings at the front and the center, and a floating ball bearing at the rear. The front and center bearings are adjustable by thousandths from the outside of the head. Transmission gears in the head are hardened and ground; all draft shafts are hardened, multiple splined, and ground. The entire head mechanism is automatically oiled with clean filtered oil by a pump circulating system.

Several additional characteristics are included in the 25-in. Pacemaker model. There is an additional speed range for the head offering nine speeds from 6 to 750 r.p.m. with a 2-to-1 adjustable-speed motor. The conventional multiple-disc starting clutch-brake unit has been replaced with an electrical control having a push button on the head to facilitate speed changing. The totally enclosed quick-change gear mechanism gives a range of 60 threads, the feeds varying from ½ to 30 threads per in., and from .004 to .240 in. per revolution.

The lathe has a carriage and apron, and the power for its six carriage feeds ranging from .002 to .012 in. per min. As an alternative to the carriage and apron, the machine can be equipped with an anti-friction-bearing cross-feed slide, which is used for such operations as forming, knurling, necking, and cutting off. It is designed for rapid approach in both directions and automatic return to center.

The two turret stations arranged for the high-speed air drills are 180 deg. apart. Only one hole is drilled in the part being produced, the tooling making possible a duplicate cycle in one complete rotation of the turret. Each high-speed air drill rotates only when in its operating position. To permit the faster handling of certain types of work there is a power-feed turret with automatic indexing on each return stroke and a range of 12 power feeds from .0005 to .016 in. A totally enclosed gearbox in the front of the machine immediately below the headstock gives this range of feeds through the turret apron, at which point the feeds are engaged as desired. Other equipment includes an air-operated bar-feed attachment and multiple positive-length stops. The lathe bed ways are flame-hardened and ground, and hardened alloy-steel parts are used throughout.

An all-electric drive, complete with motor generator set for converting alternating to direct current, is used to drive the new machine and has a 100-to-1 range of gearless, stepless spindle speeds both forward and reverse. A 6-to-1 speed reducer, integral with the drive motor in the cabinet base and operated from the front of the lathe, broadens the lower end of the spindle-speed range and at the same time develops ample power for taking heavier cuts at these low speeds.

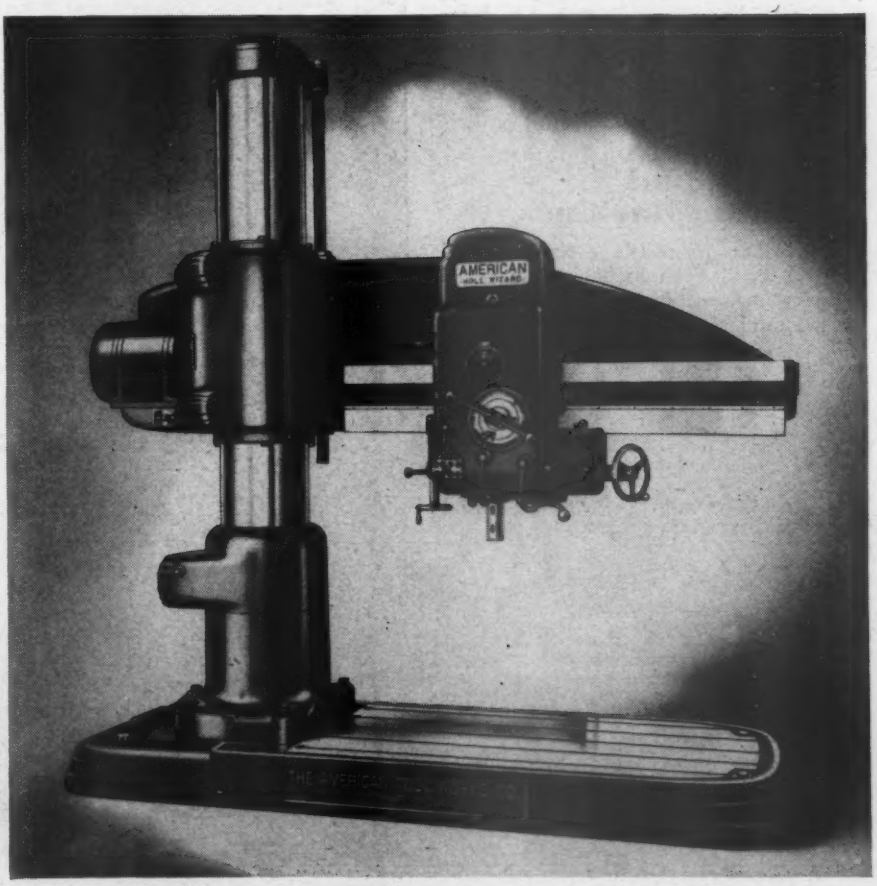
By means of a dynamic brake, the spindle may be brought to a complete stop from the highest speed in two to three seconds. The lathe may be equipped with any one of four different speed ranges, the top speed in each range being 2,500 r.p.m., 3,000 r.p.m., 3,500 r.p.m., or 4,000 r.p.m. A tachometer mounted flush in the front of the headstock indicates the exact operating speed at all times.

Lathe with High-Speed Air Drills

A 10-in. manufacturing lathe with a turret equipped to operate high-speed pneumatic air drills in two of its six stations is manufactured by The Monarch Machine Tool Co., Sidney, O. It has a spindle made from high-carbon, electric-furnace, hardened and ground steel, which is supported by precision ball bearings that are automatically lubricated to permit operation satisfactorily at speeds beyond 4,000 r.p.m. A standard camlock spindle nose provides the means of mounting chucks, plates, and fixtures. Equipped with pusher-type, lever-operated collet attachment, the machine will handle up to ⅞-in. round stock.

Radial Drill

Several features have been added to the line of Hole Wizard radial drills manufactured by the American Tool Works Company, Pearl street at Eggleston avenue, Cincinnati 2, Ohio. Both the elevating



The American Hole Wizard with a 5-ft. arm length and a 15-in. column diameter

and safety nut and the arm girdle which fits the column sleeve are automatically oiled, the nut each time the arm is raised, and the girdle by the action of the clamping mechanism. Wipers have been added to the arm girdle at the top and bottom to clean the column sleeve during movement.

Hole Wizard radial drills are manufactured in column diameters of 13, 15 or 17 in., and in arm lengths of 4, 5, 6 or 7 ft. They have a 32-speed head arranged for constant-speed motor drive with the motor direct-coupled to the initial driving shaft. There are three optional speed ranges: from 15 to 1,200 r.p.m., from 20 to 1,600 r.p.m., and from 25 to 2,000 r.p.m. The 16 feeds vary from .003 to .125 in. per revolution of the spindle. Four positive tap leads are also supplied for 8, 11½, 14 and 18 threads per in.

One of the features of this line of radial drills is the Double Lo-Hung Drive, which provides two spindle driving gears. Half of the 32 spindle speeds are obtained through one of the gears and the remaining 16 speeds through the other gear. The spindle is counterbalanced by a cylindrical weight geared to it by the pinion. To compensate for the excessive weight of large boring bars, special tools and drill heads there is an auxiliary adjustable, counterbalance actuated by a crank, each turn of which varies the tension on the spindle by one pound. As added safety features, a safety nut is integrally incorporated with the elevating nut, and a multiple-disc brake is located in the elevating box on the arm. There is an electric column clamp controlled through a push button which clamps or unclamps the column in position in ¾ of a second. For rapid head movement along the arm, a power-traverse is incorporated which moves the head at a speed of 13½ ft. per minute.

Grinding and Polishing Machine

For grinding and polishing stainless steel and other alloy sheets, a grinding and polishing machine has been developed by the Mattison Machine Works, Rockford 1, Ill. Known as the No. 455 wide-belt sheet grinding and polishing machine, it is designed with a construction said to adapt itself to the quick application of factory-coated abrasive belts.

The abrasive belt is automatically controlled and oscillated on the rolls. Push-button stations and controls for the tables are located at the front of the machine for easy access by the operator. The contact rolls are removable and rolls of any degree of cushion may be substituted according to the nature of the work.

The grinding and polishing machines can be furnished in various widths and lengths. The machines are built to process sheets up to 6-ft. wide and 16-in. long.

The Mattison No. 455 Wide Belt Sheet Grinding and Polishing Machine

Pneumatic-Tired Fork Trucks

For working outdoors and on surfaces too uneven for solid-tired machines, the Clark Tructractor Company, Battle Creek, Mich., has developed two models of gas-powered pneumatic-tired fork trucks. The Yardlift-40 is the larger of the two models. It has a capacity of 4,000 lb. at 24 in., an overall height of 85½ in., and a lift of 120 in.

The transmission provides a top speed of 9.4 m. p. h. in high and 2.9 m. p. h. in low in both forward and reverse. The engine has a mechanical governor and a water pump with thermostatic control. For accessability there are 32-in. by 11-in. side louvers and a divided hood. To permit easy clutch removal a universal joint is included between the transmission and the axle drive.

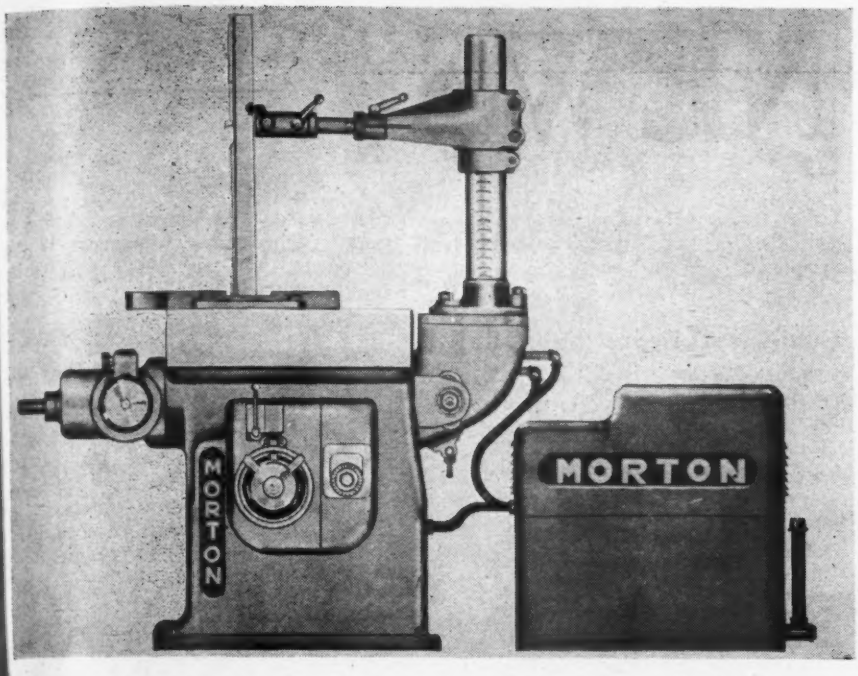
The smaller trucks, the Yardlift-20, has a 2,000-lb. capacity. Standard models have tiering heights of 72 and 118 in. Optional uprights are available with heights from 60 to 144 in. The frame is suspended at the center of the steering axle for the purpose of permitting the vehicle to conform to uneven surfaces, for better traction, and to prevent frame distortion and spring breakage.

The Yardlift-20 in operation carrying concrete blocks

Keyway Cutter and Slotting Machine

The Morton keyway cutter and slotting machine, made in 18-in. and 24-in. stroke sizes, is hydraulically driven. The top plate has machined T-slots to form a surface for securing the rapid binding attachment for holding down the work. The top plate is stationary and the necessary taper is secured through tilting the cutter bar. Tapers up to ½ in. per ft. forward and 1 in. per ft. backward may be set. The work is centered by the bore by placing against the centering jaws.

Automatic feeds give a variable rate of incremental feed from .001 to .020 in. per stroke. Automatic relief to the cutter bar on its return stroke is provided. The operating height from the table to the floor is approximately 40 in. The cutting-speed range is 10 to 25 ft. per min. with a quick return speed of 75 ft. per min. The floor



The Morton hydraulically driven keyway cutter and slotting machine

space required approximates 3 ft. wide by 8 ft. long.

Taper keyways in straight bores or straight keyways in taper bores are obtained without any special features for tilting the work in this product of the Morton Manufacturing Company, Muskegon, Mich. It is regularly equipped with a rapid binding attachment, auxiliary top plate, adjustable centering jaws and special heavy-duty upper bar-backing support and post. It is a multi-purpose tool and many slotting operations can be performed on it as well as general and production keyseating.

Heavy Duty Portable Cords

The wire and cable department of United States Rubber Company, New York, is introducing a new line of portable electrical cords featuring a heavy-duty Neoprene rubber jacket to provide increased protection against abrasion and damage.

The thickness of the jacket has been increased 30 to 60 per cent without increasing the overall diameter of the cord. This is made possible by use of Laytex insulation on the individual conductors within the cord. Laytex is applied by a dipping process which produces a thinner insulation with superior physical and electrical properties.

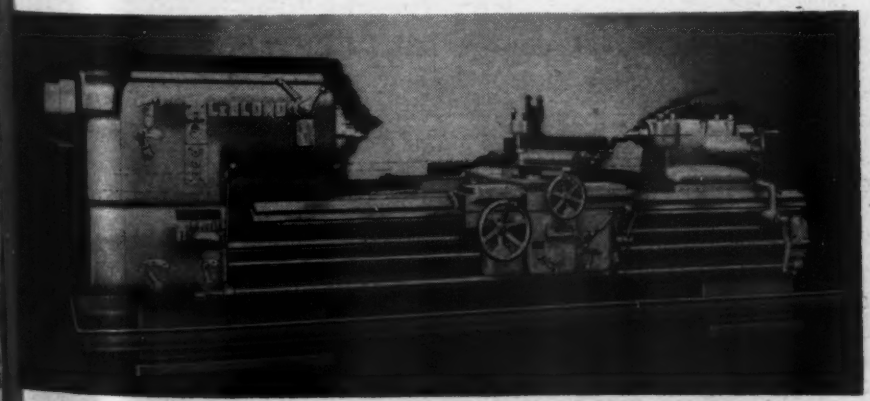
The new cables will be distributed under the name U. S. Royal Master Cords. They will be made in sizes 10 to 18 with two, three or four conductors, with or without steel wire reinforcement.

The cords are designed to withstand extreme flexing, constant movement and surface abuse. They are intended for use on portable tools and lamps, and other electrical equipment requiring a cord connection.

A 25-In. Engine Lathe

The 25-in. LeBlond heavy-duty engine lathe is said to be the first of that size ever to be built with a totally enclosed automatically lubricated quick-change box. A product of the R. K. LeBlond Machine Tool Company, Cincinnati 8, Ohio, this lathe offers 16 spindle speeds ranging from 6.5 to 400 r. p. m., or from 10 to 600 r. p. m. The geared headstock has high-speed gears hardened and ground, a one-piece apron with positive-jaw feed clutch and one-shot lubrication, a thrust-lock tailstock with the patented LeBlond worm and rack construction, and flame-hardened and ground steel bed ways front and rear.

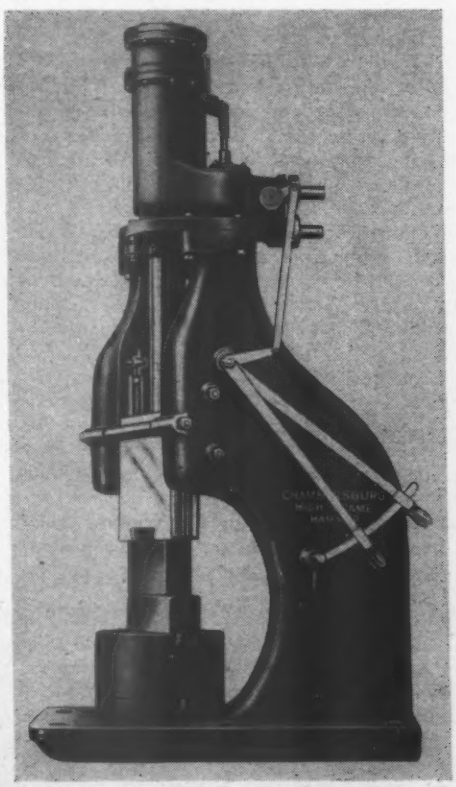
The quick-change box is sealed in an oil-tight casting, and is lubricated automaticaly, requiring no operator attention. It has steel gears throughout. Sliding gears are mounted on splined shafts, and the quadrant gear is mounted on anti-friction bearings. Forty-eight feeds and threads may be set from the direct-reading plate on the box. An additional lever engages and disengages the leadscrew.



The LeBlond 25-in. engine lathe has a totally enclosed quick-change box

High-Frame Forging Hammer

Several new features have been added to the high-frame forging hammer manufactured by the Chambersburg Engineering Company, Chambersburg, Pa. Among these are an automatically lubricated power-saving cylinder with a patented differential



The Chambersburg Model L single high-frame forging hammer

porting. Heat-treated, ground-face, alloy forged-steel dies were designed especially for this hammer to make work manipulation easier and to forge the tougher steels with fewer redressings.

This model L hammer is equipped with induction-hardened piston rings. A self-seating rotary-type throttle valve is directly connected to the throttle control for greater air or steam efficiency. The weight of the anvil has been increased. The anvil assembly, base cap, die and keys weigh fifteen times the reciprocating mass or total falling weight.

NEWS

A. W. S. Meeting Program Lists Railroad Welding Papers

THE tentative program for the American Welding Society's annual meeting at the Hotel Sherman, Chicago, during the week of October 19, schedules a railroad session for Monday, October 20, and includes subjects of general interest to the railroads' mechanical and engineering departments.

The subjects to be covered at the railroad session are: Flame-Hardening Locomotive Brake and Spring Rigging Pins and Bushings by B. W. Covell, master welder, Northern Pacific; End Hardening of Rails and Open-Hearth Frogs by R. W. Torbert, Oxweld Railroad Service Company; New Developments in Railroad Maintenance-of-Way Work by C. A. Dailey, Air Reduction Sales Co., and Problems in Resistance Welding Stainless Steel Railway Car Structures by J. Van den Beemt, welding engineer, The Budd Company.

In addition to the papers dealing specifically with railroad welding the following papers of general interest will be among those presented during the five days of technical sessions: Directional Welding to Minimize or Eliminate Distortion in Weldments and Control Residual Stresses and Welded Fabrication on October 20; Welding Locomotive-Type High Pressure Boilers, Development of Butt-Welded Joints in Pressure Vessels, Semi-Automatic Welding with Standard Manual Arc-Welding Equipment on October 21; Flash Welding of Structural Aluminum Alloys, Powder Cutting as a Production Tool, Fundamentals of Spot Welding of Steel Plate and the Development and Application of Quality Control Techniques to Resistance Welding Production on October 22; Factors Affecting Weldability of Carbon and Alloy Steels, Shape-Welding by the Submerged Welding Process and Stud Welding on October 23.

The A. W. S. annual meeting is held in conjunction with the National Metal Exposition at the International Amphitheatre, Chicago. The exposition, scheduled for a full week starting October 18, will include welding and cutting exhibits and demonstrations.

Pennsylvania Opens X-Ray Laboratory at Altoona

THE Pennsylvania announced on July 29 the opening of a new X-ray laboratory at Altoona, Pa., for examining for defects the structural metals used in locomotives, cars and rails. The laboratory building, constructed with solid concrete walls 18-in. thick to permit the use of 2,000,000-volt X-ray machines, includes a dark room in which the radiographs are developed and projection equipment for showing enlarged views of the X-ray photographs.

A mobile 250,000-volt machine is now in operation and it is planned to install a permanent unit of 1,000,000-volt capacity. The mobile equipment is for use both in the laboratory and in the adjacent construction and repairs shops.

Equipment Depreciation Rates

EQUIPMENT depreciation rates for the Texas & New Orleans prescribed by the Interstate Commerce Commission in a recent group of sub-orders in the general proceeding, Depreciation Rates for Equipment of Steam Railroad Companies, are: Steam locomotives—owned, 2.58 per cent, leased, 2.97 per cent; gasoline locomotive, 5.46 per cent; Diesel locomotives, 3.96 per cent; freight-train cars—owned, 2.75 per cent, leased, 3.65 per cent; passenger-train cars—owned, 2.88 per cent, leased, 2.97 per cent (standard equipment) and 3.94 per cent (light-weight equipment); work equipment, 3.88 per cent; miscellaneous equipment, 12.49 per cent.

Equipment on Order

CLASS I railroads and private car lines had 109,556 new freight cars on order on July 1, according to the Association of American Railroads. Of the total, Class I roads and railroad-owned privately controlled refrigerator companies had 102,6[illegible] new freight cars on order, compared with 39,437 on July 1, 1946.

Cars on order by Class I roads on July 1 included 37,799 hopper cars, of which 2,[illegible] were covered hoppers; 6,697 gondola[illegible]

Orders and Inquiries for New Equipment Placed Since the Closing of the August Issue

LOCOMOTIVE ORDERS

Road	No. of locos.	Type of loco.	Builder
Delaware, Lackawanna & Western	3[1]	4,500-hp. Diesel-elec. pass.	Electro-Motive
	1[1]	4,500-hp. Diesel-elec. frt.	Electro-Motive
	6[1]	3,000-hp. Diesel-elec. frt.	Electro-Motive
Long Island	5[2]	600-hp. Diesel-elec. switch.	Baldwin Loco.
New York, Chicago & St. Louis	11[3]	2,000-hp. Diesel-elec. pass.	American Loco.
Union Pacific	5[4]	1,500-hp. all-purpose Diesel-elec.	Fairbanks-Morse
	5[4]	2,000-hp. heavy-duty Diesel-elec.	Fairbanks-Morse

FREIGHT-CAR ORDERS

Road	No. of cars	Type of car	Builder
Baltimore & Ohio	1,500[5]	70-ton hopper	Pullman-Standard
	500[5]	70-ton covered hopper-type cement	Greenville Steel C
	1,000[5]	50-ton hopper	Bethlehem Steel
Chesapeake & Ohio	1,000[6]	70-ton covered hopper	American Car & F
Chicago & Eastern Illinois	200	50-ton welded box	American Car & F
Chicago & Illinois Midland	350	70-ton gondola	Pullman-Standard
Armour & Co.	1,000[7]	40-ton refrigerator	General-American
	1,000[7]	40-ton refrigerator	American Car & F
Chicago, Milwaukee, St. Paul & Pacific	1,000	50-ton hopper	Pressed Steel Car
Elgin, Joliet & Eastern	500	50-ton box	Magor Car
	400	50-ton drop-end gondolas	Ralston Steel Car
	100	70-ton gondolas	Greenville Steel C
Gulf, Mobile & Ohio	50	70-ton covered hopper	American Car & F
New York Central	1,000	55-ton box	Pullman-Standard
New York, New Haven & Hartford	1,000[8]	50-ton box	Pullman-Standard
Northern States Power Co.	4	70-ton triple hopper	American Car & F
Peoples Gas, Light & Coke Co.	10	Hopper	Pullman-Standard
Reading	1,000[9]	50-ton box	American Car & F
Tennessee Central	100	50-ton hopper	American Car & F
Union Pacific	1,600[10]	50-ton box	Pullman-Standard
Union Tank Car Co.	2,000	10,000 gal. tank	American Car & F
Wheeling & Lake Erie	1,000[11]	70-ton hopper	Ralston Steel Car

FREIGHT-CAR INQUIRIES

Road	No. of cars	Type of car	Builder
Atlantic Coast Line	1,000	Double-door box	
	1,500	Single-door box	
	500	High-side gondola	
	100	Low-side gondola	
	500	Hopper bottom coal	
	100	Flat	
	100	Pulpwood	
	100	Phosphate rock	
	100	Cement hopper	

[1] F-3 type.
[2] Total cost $391,000. Delivery scheduled to begin in April, 1948.
[3] Delivery to begin in December. All expected to be in service by April, 1948.
[4] Equipment expected to be completed by the end of 1947.
[5] Deliveries scheduled to begin in December.
[6] Approximate cost $3,800,000. Delivery will probably start in the second quarter of 1948. [illegible] to be of welded construction and equipped with friction bearings.
[7] Delivery scheduled to begin in first quarter of 1948.
[8] For delivery early in 1948.
[9] Delivery scheduled for first quarter of 1948.
[10] To be delivered in the first quarter of 1948.
[11] To be delivered in December.

NOTES:—
Baltimore & Ohio.—The B. & O. has announced the purchase of 13 Mountain-type locomotives [illegible] the Boston & Maine. Each engine has a tractive force of 67,000 lb., a tender capacity of [illegible] of coal and 20,000 gal. of water.
New York Central.—The New York Central has purchased 200 troop sleeping cars from the [illegible] Assets Administration. The equipment will probably be transformed into baggage cars.

the tough guy goes round and round

Mileage figures show how tough the Tough Guy really is — how, as a Chilled Car Wheel of today, he's getting tougher as the service he's in gets more and more rugged.

Going round and round in one sense of the word means staying round and round in another sense. And we at AMCCW provide and enforce a code of wheel manufacturing practice that includes tests on each and every wheel for rotundity. Not only is a wheel's original rotundity assured by this 100% check, but more rigid testing for chill depth around the entire circumference of test wheels assures the maintenance of this rotundity.

The AMCCW code must be fully followed by all member manufacturers. The Tough Guy must fully live up to his name.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
445 NORTH SACRAMENTO BOULEVARD, CHICAGO 12, ILL.

American Car & Foundry Co. • Canadian Car & Foundry Co. • Griffin Wheel Co.
Marshall Car Wheel & Foundry Co. • Maryland Car Wheel Co. • New York Car Wheel Co.
Pullman-Standard Car Mfg. Co. • Southern Wheel (American Brake Shoe Co.)

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1,093 flat, 9,725 refrigerator, 50 stock, 318 miscellaneous freight cars and 46,952 box cars, including 43,118 plain and ventilated and 3,834 automobile box cars. Of the total number of new freight cars which Class I roads had on order on July 1, 24,484 will be built in railroad shops and 78,150 in outside shops.

The Class I roads had 794 locomotives on order on July 1, compared with 615 on the same day in 1946. The former total included 24 steam, five electric and 765 Diesel-electric locomotives, compared with 86 steam, six electric and 523 Diesel-electrics a year ago.

Class I roads installed 20,735 new freight cars in service in the first half of 1947, of which 5,249 were installed in June. New freight cars put in service in the first six months of 1946 totaled 18,256. Those installed in the 1947 period included 5,498 hopper cars, of which 870 were covered hoppers; 1,860 gondolas, 1,276 refrigerator, 454 flat, 500 stock, 100 miscellaneous freight cars and 11,047 box cars, including 8,614 plain and ventilated and 2,433 automobile box cars.

The Class I roads also put 418 new locomotives in service in the first six months of 1947, of which 63 were steam, one electric and 354 Diesel-electric. New locomotives installed in the same period last year totaled 180, of which 56 were steam and 124 Diesel-electric.

The Class I roads retired 25,918 freight cars in 1947. As of July 1, 1946, there were 29,021 cars retired.

Shop Construction

The New York, Chicago & St. Louis has awarded a contract to E. J. Benes & Co., Cleveland, Ohio, for the construction of Diesel-electric locomotive servicing facilities at East Seventy-fifth street in Cleveland. The project will cost approximately $375,000.

Supply Trade Notes

GEORGE H. WOODWARD, formerly manager of the aviation gas-turbine division of the Westinghouse Electric Corporation, has entered private practice as a consulting engineer to serve railway supply manufacturers in the development and introduction of new product lines.

◆

H. K. PORTER COMPANY.—*Harold A. Hintz* has been appointed Pacific Coast sales manager for the H. K. Porter Company, with headquarters in Los Angeles, Calif., and *J. F. Morley* has been appointed district sales engineer, with headquarters in San Francisco, Calif.

◆

LIMA LOCOMOTIVE WORKS; GENERAL MACHINERY CORPORATION.—A plan to combine the activities of the Lima Locomotive Works, Inc., Lima, Ohio, and General Machinery Corporation, Hamilton, Ohio, has been authorized by the respective boards of directors and will be submitted to stockholders of each company for approval at special meetings to be held on October 1, 1947, according to a joint announcement made by Samuel G. Allen and John E. Dixon, chairman of the board and president, respectively, of Lima Locomotive Works, and George A. Rentschler, chairman of General Machinery Corporation. After the plan is made effective the company will be known as the *Lima-Hamilton Corporation*. The Lima Locomotive Works has not heretofore constructed Diesel locomotives, but it is contemplated that once the plan is approved by stockholders immediate steps will be taken to begin manufacture of Lima-Hamilton Diesel locomotives. The business of Lima Locomotive Works was established in 1869 at Lima, Ohio, and the origin of General Machinery Corporation dates back to 1845. The General Machinery Corporation, over a period of years, acquired the business of the Niles Tool Works Company; the Hooven, Owens, Rentschler Company, and the Hamilton Press and Machinery Company. In addition to Diesel engines, General Machinery produces large presses for the automotive industry, and, in its Niles Tool Works Division, railroad and industrial machine tools. For the last three or four years it has been at work on a new development—a free-piston gas generator turbine which, as a prime mover, has application to locomotives, ships and stationary power plants.

It is contemplated that Mr. Allen will be chairman of the board of the Lima-Hamilton Corp., and George A. Rentschler will become chairman of the executive committee. John E. Dixon, now president of Lima, will remain in that position.

◆

VAPOR CAR HEATING COMPANY.—*George M. Egart* has been appointed sales engineer of the Vapor Car Heating Company, at Chicago.

◆

WAUKESHA MOTOR COMPANY.—*Charles E. Nelson, Jr.*, director of purchases and production planning for the Waukesha Motor Company, has been appointed also to the newly created position of assistant to the president.

Charles E. Nelson, Jr., joined the Waukesha Motor organization in 1929, where he first worked in the financial department. He was subsequently appointed secretary and treasurer of the Faegol Truck & Motor Coach Co. of Oakland, Calif., which, in 1933, became a subsidiary of the Waukesha Motor Company. Returning to the parent company in 1934, Mr. Nelson was appointed factory production manager and in June, 1936, director of purchases and production planning.

Charles E. Nelson, Jr.

◆

AMERICAN WELDING & MANUFACTURING Co.—*Frank J. Shanaberg*, formerly sales promotion manager has been appointed assistant eastern district sales manager of New England, eastern New York and Pennsylvania and Washington, D. C.

The eastern district offices of this company have been removed from 500 Fifth avenue, New York, to 1060 Broad street, Newark 2, N. J.

◆

AIR REDUCTION SALES COMPANY.—The Air Reduction Sales Company has opened a new acetylene plant in Dayton, Ohio, with *R. K. Haygood* as plant superintendent.

◆

ALLEGHENY LUDLUM STEEL CORPORATION.—*E. B. Cleborne*, vice-president and a director of the Allegheny Ludlum Steel Corporation, has been elected executive vice-president.

◆

APEX RAILWAY PRODUCTS COMPANY.—*Robert J. Drewniak* has been appointed assistant to the president, and *Norman F. Woods*, assistant to the vice-president of the Apex Railway Products Company, at Chicago. Mr. Drewniak was formerly district sales division manager of the A. O. Smith Corporation, Milwaukee, Wis. He was born at Milwaukee and received his higher education at Marquette University. Mr. Woods, who was born in Chicago, holds a degree in mechanical engineering from Marquette University. Prior to enlisting in the U. S. Navy Air Corps in 1942, he was a production engineer with General Motors Corporation.

◆

ALLIS-CHALMERS MANUFACTURING COMPANY.—*R. C. Allen*, whose promotion to manager and chief engineer, turbo-power development department, of the Allis-Chalmers Manufacturing Company at West Allis, Wis., was reported in the August issue, was born at Hartford, Conn., on July 16, 1889. He began his engineering career with Pratt & Whitney, Hartford. He later served 5½ years with the Ter-

New Revenue from *streamlined scheduling*

Modern steam locomotives are powerful, fast, and capable of keeping heavy payloads moving at high speed over difficult terrain. But, they cannot produce revenue when they are lying in the yards awaiting re-assignment.

Get the high monthly mileage for which your modern steam locomotive was designed. A series of availability studies followed up by revisions in scheduling will pay quick returns. It will prove conclusively that the modern steam locomotive is, and will continue to be, a potent factor in *economical* railroading.

LIMA LOCOMOTIVE WORKS INCORPORATED, LIMA, OHIO

Steam Turbine Company, Hartford—the last three years as assistant chief engineer, and then joined the Westinghouse

R. C. Allen

Electric & Manufacturing Co., East Pittsburgh, Pa. He served at East Pittsburgh for 16 years—the last five as manager of large turbine engineering. Subsequently he was manager of engineering of the A. O. Smith Corporation, Milwaukee, Wis., and chief engineer of the Murray Iron Works Company, Burlington, Iowa. He became associated with Allis-Chalmers in July, 1936, as manager and chief engineer of the steam turbine department.

W. A. Yost, Jr., whose appointment as manager of the steam turbine department of Allis-Chalmers, at West Allis, Wis., was reported in the August issue, was born in North Carolina. He is a graduate of North Carolina State College (1927). He began his business career in 1927 with the

W. A. Yost, Jr.

Elliott Company, at Jeannette, Pa. In 1943 he joined Allis-Chalmers as manager of the marine division of the steam turbine division. Mr. Yost has been identified with the turbine section of the National Electrical Manufacturers Association since its inception.

◆

GLOBE STEEL TUBES COMPANY.—*John F. Scott* has been appointed chemical and metallurgical sales representative for the New York district office of the Globe Steel Tubes Company.

FAIRBANKS, MORSE & CO.—*Onni Linafors,* design engineer in the electrical division of Fairbanks, Morse & Co., at Beloit, Wis., has been appointed chief electrical engineer of the company's plant at Freeport, Ill.

◆

HASKELLITE MANUFACTURING CORPORATION.—The Haskellite Manufacturing Corporation, Grand Rapids, Mich., the producer of Plymetl, has acquired a new plant for $1,200,000 from the War Assets Corporation as an addition to its present facilities at Grand Rapids. The structure is an air-conditioned windowless building containing 230,000 sq. ft. of floor space.

◆

AMERICAN CHAIN & CABLE CO.—*E. B. Brant* has been appointed district sales manager of the Page steel and wire division of the American Chain & Cable Co., to succeed *Fred H. Jones,* who has retired because of ill health. Mr. Brant, who has been with the Page steel and wire division in Detroit, Mich., will now make his headquarters at the Pittsburgh, Pa., office.

◆

STERLING ENGINE COMPANY.—*James B. Porteus* has been elected to the board and named president of the Sterling Engine Company of Buffalo, N. Y., to succeed *Additon F. Vars,* who has resigned. Mr.

James B. Porteus

Vars, who has been elected chairman of the board of directors, will be on leave of absence until November 1, when he will assume his new duties.

◆

BALDWIN LOCOMOTIVE WORKS. — *J. F. Kirkland* has been appointed Pacific Coast district manager of the Baldwin Locomotive Works, with headquarters at San Francisco, Calif., succeeding *W. F. Boyle. Frank B. Powers,* assistant to vice-president-operations of the Eddystone division, has been given complete responsibility for all engineering activities of that division.

◆

ALL-STATE WELDING ALLOYS COMPANY. —*Richard T. Spear* has been appointed regional sales manager of the All-State Welding Alloys Company, covering eastern Pennsylvania, south New Jersey, Virginia, West Virginia, Delaware, Maryland and the District of Columbia. Mr. Spear was formerly associated with the Pan-American World Airways.

CARNEGIE-ILLINOIS STEEL CORPORATION. —*G. A. Price,* whose appointment as head of the consolidated sales organization of

G. A. Price

the Carnegie-Illinois Steel Corporation (a subsidiary of the United States Steel Corporation) in the Chicago area was reported in the August issue, was born in Chicago and was educated at Northwestern University. He entered the service of Carnegie-Illinois nearly 28 years ago, and since 1920 has served in various sales capacities. In 1939 he was named head of the Chicago district sales organzation, which will be replaced by the new consolidated sales organization under his direction.

E. W. Backes, whose appointment as Chicago area railroad industries sales manager of Carnegie-Illinois was reported in the August issue, was born in New York

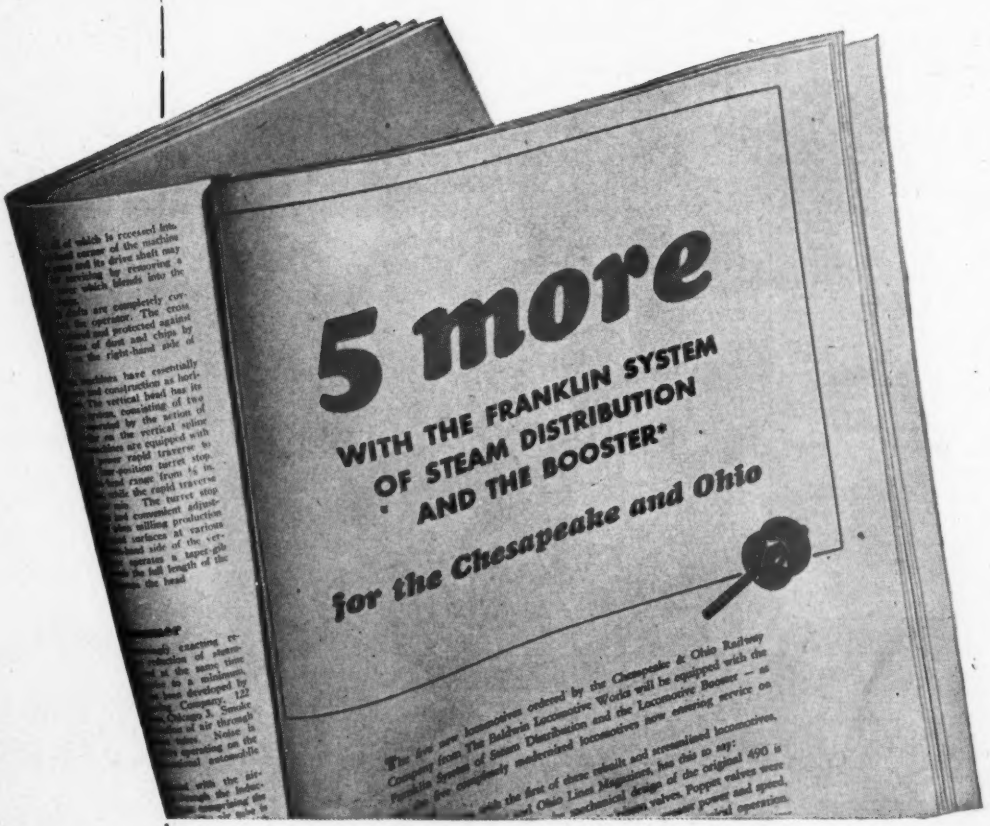
E. W. Backes

and educated at the Pennsylvania Military College and at Yale University. He entered the service of Carnegie-Illinois in 1940, and was appointed assistant manager of sales for railroad materials on January 1, 1946. Previously he had served in sales engineering in the railroad material and commercial forgings division of the Chcago general sales organization.

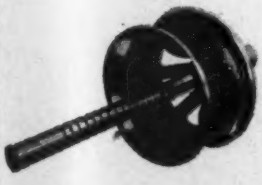
◆

CUMMINS ENGINE COMPANY.—The following four new personnel assignments have been made in the distribution division of the Cummins Engine Company, Columbus, Ind.: *S. J. Coffey,* formerly manager of the Cummins Diesel Sales Corporation of Illinois, has been appointed manager of

WILL USE TYPE B



The Franklin System of Steam Distribution, Type B — with poppet valves, rotary drive, and continuous-contour cams — will be applied to the new 4-6-4 locomotives recently ordered by the Chesapeake & Ohio from the Baldwin Locomotive Works.



FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK • CHICAGO • MONTREAL

STEAM DISTRIBUTION SYSTEM • BOOSTER • RADIAL BUFFER • COMPENSATOR AND SNUBBER • POWER REVERSE GEARS
AUTOMATIC FIRE DOORS • DRIVING BOX LUBRICATORS • STEAM GRATE SHAKERS • FLEXIBLE JOINTS • CAR CONNECTION

For additional information, use postcard, pages 55-56

Magnews

Newsworthy Items for Those Concerned with Industrial Cleaning and Related Problems.

September, 1947

NEW CLEANING IDEAS

For Further Details Write Magnus

Utility Cleaning Machine for Small Parts—The Magnus Aja-Dip Jr—is ideal for use with Magnus 755 in removing grease and carbonized oil from small parts. Can be used with alkaline and other types of cleaners as well. No. 117

●

Dangerous Hand Cleaners are Costing You Plenty! If your personnel is using harsh, gritty hand cleaners, it will pay you to study Magnus Bulletin 51—"The Care and Cleaning of Hands and Arms." Write for a copy and see what a safe hand cleaner can do to cut time losses. No. 118

●

Having Any Trouble with Fuel Oil Sludge? Clogged screens? Carbonized burner tips? Poor combustion control? Magnus Clerex stops sludge formation in the heaviest oils. All you need is a few drops per gallon! No. 119

●

Clean up your Shop Machines with Magnusol. You don't have to dismantle. Just spray on the usual 1-8 Magnusol-kerosene mixture, let soak and pressure rinse with water. You get completely clean machines, without harm to any parts or painted surfaces. No. 120

Try Magnus 755 on Those Stubborn Bull Rings

Whenever you have to clean a badly carbonized bull ring, remember that Magnus 755 was specifically designed for the removal of stubborn carbon deposits. This neutral emulsion-solvent cleaner was originally developed for the Army Air Forces to solve the wartime problem of removing the really tough carbonized oil deposits met with in the parts of combat plane engines. Since the war it has been universally successful on all types of carbonized deposits.

On bull rings, the working solution is made up of eight parts Magnus 755, covered with a water seal of two parts to prevent loss of volatile ingredients. Cleaning temperature is 150°F. Rings are soaked for 12-18 hours in this solution, then pressure rinsed with water. Light brushing may be required in a few rare cases to remove residual deposits, but ordinarily hand work is not necessary.

In a Magnus Aja-Dip Cleaning Machine, where dynamic agitation is provided, bull rings can be cleaned in Magnus 755 in a few hours.

Cuts Diesel Parts Cleaning Time by 75%

Magnus 755, in this Magnus Aja-Dip Cleaning Machine, does a better cleaning job in two hours on liners than an ordinary solvent in a still tank used to do in 18! Heads which formerly took 24-30 hours are cleaned by this Magnus combination in four! On the average, parts are now cleaned and ready for

reinstallation in about one-fourth the time formerly required. Not only are they cleaned faster and better, but hand work has been practically eliminated.

There is no more effective cleaner for carbonized oil deposits than Magnus 755. And the range of capacity in Magnus Aja-Dip Machines makes it possible to meet any required volume of parts called for in your shop.

Magnusol Simplifies Air Filter Cleaning

Just dip any type of air filter in a 1 to 6 Magnusol-kerosene mixture. Then drain, rinse with water under pressure or with a steam gun. After drying, filters are ready for re-oiling without any further treatment. Safe, sure and speedy, the Magnusol method insures efficient filtering action at all times.

Magnus Chemical Co., 77 South Ave., Garwood, N. J. In Canada—Magnus Chemicals, Ltd., 4040 Rue Masson, Montreal 36, Que.

regions; *Byron A. Duling,* formerly manager of the Cleveland regional office, has been appointed manager of engine distribution, with headquarters at Columbus; *Raymond Boll,* formerly a member of the sales department, has been appointed assistant manager of the Cleveland region, with headquarters in Cleveland, Ohio, and *W. C. Phillips,* formerly sales engineer, has been appointed assistant manager of the southeastern region, with headquarters at Columbus.

◆

M. E. KLINE & CO.—*Mason E. Kline* has announced the formation of M. E. Kline & Co., at 625 Market street, San Francisco, Calif. He resigned recently as vice-president and general sales manager of the Union Lumber Company. The new company will make wholesale distribution of railroad and industrial forest products, with special emphasis on lumber, timbers, ties, poles, and piling.

◆

AMERICAN CAR & FOUNDRY CO.—*Lloyd H. Mulbarger* has been appointed sales engineer for the American Car & Foundry Co., with headquarters in New York. *L. B. Chapman,* formerly with the marine division of A. C. F., has been appointed assistant manager of the valve division, with headquarters in the New York sales office. *H. P. Ackerman,* formerly assistant manager of sales promotion in the eastern states, has been appointed general sales representative of the valve division.

Lloyd H. Mulbarger

Lloyd H. Mulbarger began his career in transportation in 1926 as an apprentice with the New York, Chicago & St. Louis, at Lima, Ohio. In 1929 he was transferred to Cleveland, Ohio, as a car draftsman in the engineering department. Two years later he was transferred to the Advisory Mechanical Committee of the Chesapeake & Ohio, the Erie, the Nickel Plate, and the Pere Marquette, on which committee he served as leading draftsman, assistant chief draftsman and later chief draftsman.

◆

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY.—*K. W. Schick,* formerly sales manager of the railway division of the Minneapolis-Honeywell Regulator Company, has been appointed southwest regional manager, with headquarters at Dallas, Tex. *M. R. Eastin* succeeds Mr. Schick.

Maurice R. Eastin, formerly eastern zone

A working model of this boiler

with Security Circulators showing water circulation . . will be in operation at the American Arch Exhibit

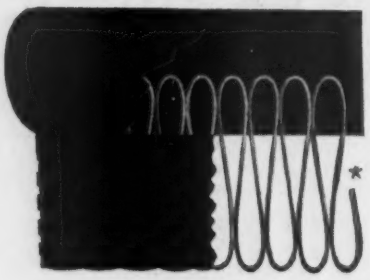
AMERICAN ARCH COMPANY, INC.

NEW YORK • CHICAGO

SECURITY CIRCULATOR DIVISION

Bridgeport
INNER-SEAL
WEATHER STRIPPING

Inner-Seal keeps out dirt and dampness — keeps heat or cold in or out.



Inner-Seal makes doors and hatches water and weather tight; protects cargo and interiors.

the ideal insulating seal for railway car installations

Bridgeport Inner-Seal, the ideal insulating seal, effectively and economically protects against weather, moisture and dirt. Its unique design and rugged construction make it, at the same time, the strongest and most flexible weather stripping for industrial applications. Live sponge rubber that makes a tight, contour-conforming seal is molded, for life, onto tough spring wire to provide unequalled flexibility for fitting sharp corners and compound curves. Inner-Seal has been proved by years of use in aircraft, railway cars, trucks, busses, ships and commercial refrigerators.

Inner-Seal protects against temperature and pressure variations; reduces noise for passenger comfort.

Inner-Seal eliminates rattles; assures safe transport of perishables.

Inner-Seal insures dust-free, weather-proof, comfortable interiors.

Inner-Seal is manufactured in many standard sizes and colors for immediate delivery, or may be specially designed to meet unusual applications. Write for complete information and samples.

★
TOUGH STEEL SPRING WIRE MOLDED INTO LIVE SPONGE RUBBER

Bridgeport
FABRICS, INC.
BRIDGEPORT 1, CONN.
Est. 1837

THE HOLDEN CO. LTD.
MONTREAL, TORONTO, WINNIPEG, VANCOUVER

manager for the railway controls division of Minneapolis-Honeywell, has been appointed sales manager of the railway division. (A photograph and sketch of Mr. Eastin's career appeared on page 504 of the September, 1946, *Railway Mechanical Engineer.*)

◆

WHITING CORPORATION.—*George P. Fisher,* director of personnel of the Whiting Corporation, Harvey, Ill., has been elected also a vice-president of the company. *A. J. Grindle,* manager of the foundry equipment department, has been elected vice-president in charge of foundry equipment sales.

Obituary

E. C. ZIMMERMAN, chief engineer of the Q & C Co., died on July 27. He was 58 years old.

◆

CRAWFORD NEAL KIRKPATRICK, chairman of the board of the Landis Machine Company, Waynesboro, Pa., died at his home in Waynesboro on July 28 at the age of 57.

◆

P. P. BARTHELEMY, consultant and service engineer of the Miller Waste Mills, Inc., Winona, Minn., and the Nash-Finch Company, Minneapolis, Minn., since his retirement in January, 1946, as master car builder of the Great Northern, at St. Paul, Minn., died in that city on July 28. Mr. Barthelemy was born in Benton county, Minn. He received his higher education at

P. P. Barthelemy

the University of Minnesota, and entered railroad service as a mechanic in the shops of the Great Northern at St. Cloud, Minn. He advanced successively through the positions of air brake foreman and assistant car foreman at St. Cloud and car foreman at Spokane, Wash. From 1915 to 1917 he was employed on car valuation work. In 1917 he became assistant general car foreman at Great Falls, Mont.; in 1919 general car foreman at St. Paul; in 1923 assistant master car builder at St. Paul, and on December 1, 1937, master car builder. Mr. Barthelemy was an active member of the Lubrication committee of the Mechanical Division of the Association of American Railroads while he was still master car builder of the Great Northern, and also served on the Lubrication committee of the Car Department Officers Association.

10-YEAR RECORD OF

General Motors Diesel Switchers on the Boston and Maine

Locomotive Number	Month Delivered	H.P.	Location	Total Hours Worked	Average Hours Worked Per Mo.	Per Cent Availability
1103	8-36	600	Lawrence, Mass.	75,268	606	89.4
1104	8-36	"	Boston, Mass.	76,310	614	89.2
1105	8-36	"	Boston, Mass.	74,222	598	87.9
1106	7-38	"	Fitchburg, Mass.	64,683	637	91.9
1107	7-38	"	Fitchburg, Mass.	63,977	630	92.1
1108	7-38	"	Boston, Mass.	64,631	637	91.2
1109	11-39	"	Boston, Mass.	52,278	613	89.9
1110	11-39	"	Boston, Mass.	52,688	618	90.3
1111	11-39	"	Boston, Mass.	51,305	605	89.9
1112	11-41	"	Mechanicville, N. Y.	36,675	601	93.7
1113	11-41	"	Mechanicville, N. Y.	38,437	633	95.5
1114	10-46	"	Troy, N. Y.	1,131	514	98.5
1115	10-46	"	Boston, Mass.	1,305	621	95.7
1116	10-46	"	Boston, Mass.	1,153	607	94.6
1117	10-46	"	Boston, Mass.	1,217	641	93.4
1200	11-41	1000	Mechanicville, N. Y.	36,771	601	89.8
1201	11-41	"	Mechanicville, N. Y.	38,054	621	90.9
1202	7-42	"	Boston, Mass.	32,414	604	93.4
1203	7-42	"	Mechanicville, N. Y.	33,963	632	93.7
1204	7-42	"	Mechanicville, N. Y.	33,281	622	93.7
1205	9-46	"	Mechanicville, N. Y.	1,998	571	99.1
1206	9-46	"	Boston, Mass.	2,045	601	92.8
1207	9-46	"	Boston, Mass.	2,137	629	93.1
				835,943	616 (Av.)	91.0 (Av.)

GENERAL MOTORS LOCOMOTIVES

ELECTRO-MOTIVE DIVISION

GENERAL MOTORS — LA GRANGE, ILL.

BEATTY Guillotine Bar Shear in capacities up to 300 ton.

BEATTY No. 11-B heavy duty punch for production tooling and use with BEATTY Spacing Table.

BEATTY No. 14 Toggle Beam Punch for structural steel fabrication.

BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging, bending.

BEATTY 250-ton gap type press for forming, bending, flanging, pressing.

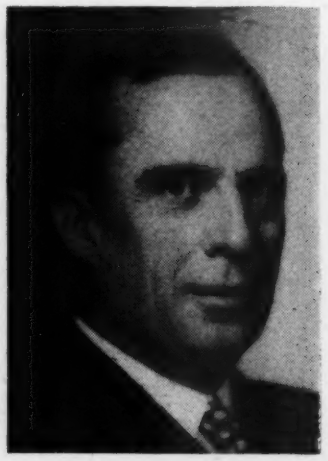
WHEN SEARCHING FOR PRODUCTION IMPROVEMENTS
STANDARD
TODAYS SPECIAL!
MACHINES
DONT LET THE LIMITATIONS OF STANDARD MACHINES LIMIT YOUR THINKING!
BRING US YOUR PROBLEMS AND IDEAS...
AND LET US BUILD A MACHINE AROUND THEM. THATS THE WAY TO GAIN A TRUE COMPETITIVE PRODUCTION ADVANTAGE
THERE'S A BETTER WAY TO DO IT!

HYDRAULIC HEAVY METAL WORKING EQUIPMENT

BEATTY MACHINE AND MFG. COMPANY
HAMMOND, INDIANA

513 (Adv. 84)

RALPH A. CORLEY, president of the Corley Company, died on August 14, at his home in Mountain Lakes, N. J., after a long illness. Mr. Corley, who was born in Montreal, Que., in 1884, came to the United



Ralph A. Corley

States as a young man. He became associated with the Canadian-Fairbanks Company in 1909 and, in 1911, joined the Michigan Wheel Company. He formed the firm of Young, Corley & Dolan in 1915 and the Corley-DeWolf Company in 1919, shortly after which the latter became the Corley Company. Mr. Corley was president of the company for the 26 years of its existence.

◆

JOHN R. HOLTOM, mechanical expert in the Chicago office of the Westinghouse Air Brake Company, died at his home in Chicago on July 21. Before joining Westinghouse in 1923 Mr. Holtom had been a locomotive engineer for the Michigan Central.

◆

HARRY M. EVANS, former vice-president of the Franklin Railway Supply Company, New York, died at his home in Lyons, N. Y., on August 2. Mr. Evans, who was 76 years old, joined the Franklin Company in 1908 and was with the firm until his retirement on January 1, 1946.

Personal Mention

General

O. A. GARBER, chief mechanical officer of the Missouri Pacific at St. Louis, Mo., has retired. Mr. Garber was born at Springfield, Ill., on October 15, 1874, and entered railroad service in 1891 as a machinist apprentice on the Wabash at Springfield. In 1901 he became erecting and enginehouse foreman of the Baltimore & Ohio at Lorain, Ohio. Two years later he went with the Illinois Central as erecting and enginehouse foreman at Paducah, Ky. In 1909 he became general foreman at Mounds, Ill., whence he was transferred to Paducah. In 1912 he was ap-

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The Symbol of SERVICE

MILLIONS OF MILES TOGETHER

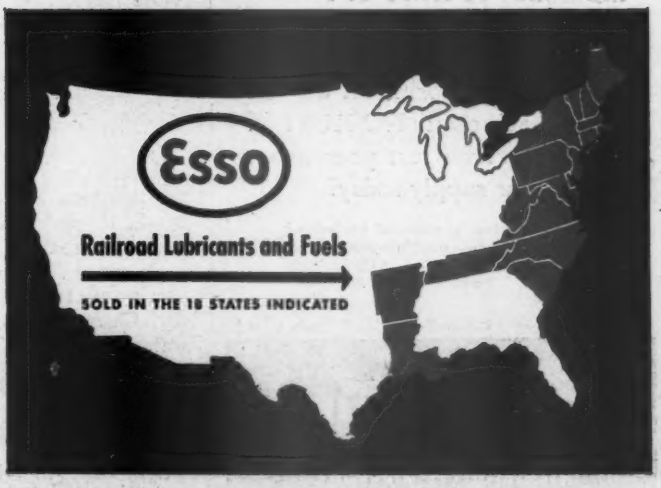
. . . Esso Railroad Fuels and Lubricants have established performance and protection records on America's leading railroads. Developed in the great Esso Laboratories, often in advance of railroad requirements, these fine products are made to work with dependability and economy.

STANDARD OIL COMPANY OF NEW JERSEY

Elizabeth, N. J.	Charleston, W. Va.	New Orleans, La.
Baltimore, Md.	Charlotte, N. C.	Little Rock, Ark.
Richmond, Va.	Columbia, S. C.	Memphis, Tenn.

STANDARD OIL COMPANY OF PENNSYLVANIA
Philadelphia, Pa.

COLONIAL BEACON OIL COMPANY
Boston, Mass. — New York, N. Y.



...but Rust can

You can brush away the cobwebs from idle rolling stock in a matter of minutes, but maintenance engineers know that the ravages of rust and corrosion eat up time and money as well as metal.

SPECIFY THE ORIGINAL AND ONLY NO-RUST

Every exposed ferrous metal working part on an idle locomotive is prey to rust. Easily applied NO-RUST gives safe, sure, low-cost protection for as long as the equipment is idle.

You'll cut maintenance costs and lengthen the life not only of your rolling stock, but of all the thousands of items of ferrous metal in the shop, in warehouses, in section houses, in yards, and on station platforms all up and down the line with NO-RUST... the *shop-proved* rust preventive. Order your supply today!

We specialize in railroad protective finishes; GRAPAK front end paint . . . oil stain and car sealer . . . VERNIX floor hardener . . . freight car primer and finish.

Frost PAINT AND OIL CORPORATION
MINNEAPOLIS 13, MINNESOTA

pointed master mechanic at East St. Louis, Ill. In 1918 Mr. Garber was transferred to Waterloo, Iowa, and later to Memphis, Tenn. In March, 1925, he was appointed mechanical superintendent of the Missouri Pacific, with headquarters at St. Louis; in September, 1926, assistant chief mechanical

O. A. Garber

officer, and one month later chief mechanical officer.

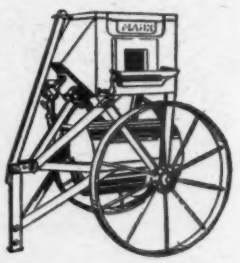
A biography of Mr. Garber was published in the January, 1945, *Railway Mechanical Engineer*, page 6.

J. E. BROWN, superintendent of motive power of the St. Louis Southwestern, with headquarters at Pine Bluff, Ark., has retired after 46 years of service with the railroad. Mr. Brown was born at Andover, Ill., on November 26, 1877. He began his railroad career with the Kansas City Southern in 1900. In 1901 he joined the Cotton Belt as chief draftsman at Pine Bluff. In 1916 he was appointed mechanical engineer. In 1918 he entered military service, returning to the position of mechanical engineer at Pine Bluff at the end of the war. In 1923 he was appointed assistant superintendent of motive power, and in 1943 superintendent of motive power.

L. R. CHRISTY, superintendent of the car department of the Missouri Pacific, at St. Louis, Mo., has been appointed chief mechanical officer with headquarters at St. Louis. Mr. Christy was born at Water Valley, Miss., on December 19, 1894, and entered railway service on the Illinois Central as a car repairer apprentice at Water Valley. In April, 1912, he was appointed car repairer, and later served as air-brake repairer, car inspector, chief clerk, and traveling master car-builder inspector. On June 9, 1916, he went with the Southern Pacific at Tucson, Ariz., as M. C. B. clerk. He worked alternately in various capacities in the mechanical department at Tucson and attended the University of Arizona until January 31, 1922. Mr. Christy returned to the Illinois Central on February 3, 1922, as an air-brake foreman at Memphis, Tenn., later becoming rebuilding car foreman. On March 1, 1924, he entered the service of the Missouri Pacific as assistant general car inspector and a short time later was appointed general car inspector. On February 16,

RAILROAD **MAHR** EQUIPMENT
ENGINEERS · DESIGNERS · MANUFACTURERS
ALL EQUIPMENT FOR METAL HEATING

Built by specialists in railroad equipment for 33 years, MAHR forges, torches, furnaces, burners, blowers, valves and similar equipment are dependable, safe, efficient and economical.



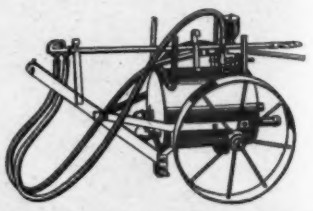
MAHR NO. 19 VACUUM TYPE RIVET HEATER

Portable, compressed air, oil-fired rivet forge. Heats 300 to 400 ¾" x 3" rivets or 65 lbs. of small parts per hour. Rugged and dependable.

Completely safe. Vacuum type burners require no pressure on fuel tank or fuel line. If forge overturns, valve in tank filler cap closes . . . prevents oil from flowing out.

When compressed air (80-100 lbs.) is connected, oil is drawn from tank to burner, mixed with air, atomized and sprayed into combustion chamber. Lights easy... burns steady . . . creates *intense* heat.

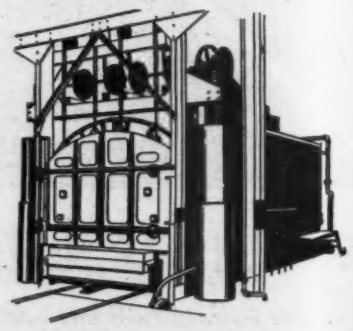
Stationary unit (Model No. 17) also available.



MAHR LOCOMOTIVE FIRE LIGHTER

Provides *better* fire bed *faster*, with far less trouble than old methods. Extra long nozzle supplies very hot, *wet* flame directed downward, spreading over wide area. Wet flame soaks coal with hot oil for *quick, hot* fire, with little or no smoke.

Positively safe. No pressure on tank. Oil drawn from tank by vacuum created by compressed air. No danger of bursting oil hose or exploding tank. Uses kerosene, distillate or low grade fuel oil. Steam coil provided through tank to pre-heat oil in cold weather.



MAHR CAR BOTTOM ANNEALING FURNACES

These versatile annealing furnaces are adaptable to many heat treating processes such as carburizing, drawing or tempering, hardening, normalizing, spheroidizing and stress relieving. Economical gas or oil burners give accurate, uniform temperatures. Heat *over* and *under* charge for faster heat penetration. Rugged construction . . . dependable service . . . low maintenance. Temperature range up to 1800°F. Made in sizes to meet your requirements.

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MAHR RIVET HEATERS • FORGES • TORCHES
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DIVISION OF DIAMOND IRON WORKS, INC
1700 2nd St. N., MINNEAPOLIS, MINN.

REDUCE WHEEL-FLANGE WEAR

with National Rubber-cushioned Draft Gears

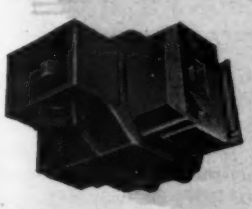
• The shorter length of National Rubber-cushioned Draft Gears results in reduced distance from truck center to coupling line and hence lessens the lateral angling of the coupler. This reduces lateral wheel-flange pressure from 15% to 25%—thus decreasing wheel maintenance costs and increasing safety.

CONSIDER THESE ADVANTAGES

CONTINUOUS PROTECTION for locomotives, cars, passengers and ladings is another benefit from National Rubber-cushioned Draft Gears. That's because they are relatively slow acting under slowly applied loads, yet provide greatly increased cushioning ability under shock or impact.

SOFTER, SAFER RIDING builds passenger good will, reduces damage to ladings. You get this smoothness with National Rubber-cushioned Draft Gears because they show no tendency to creep solid—yet are continuously responsive to the high tractive force of modern diesel and electric locomotives.

Ask for Proof . . . ask our representatives to give you details on how National Rubber-cushioned Draft Gears bring smoother riding, less maintenance and increased protection.



Type M-385 for extremely heavy diesel and electric freight locomotives.

Type M-380 for heavy diesel passenger locomotives and diesel and electric freight locomotives.

Type M-350-A for diesel passenger locomotives.

Type M-375 for diesel switching locomotives.

NATIONAL MALLEABLE AND STEEL CASTINGS CO.

CLEVELAND, OHIO

ESTAB. 1868

Wing
REVOLVING
UNIT HEATERS
insure complete
HEAT COVERAGE

ADVANTAGES OF WING REVOLVING UNIT HEATERS

1. Makes workers feel comfortable, live and invigorated — more productive.
2. Reaches over and around obstructions and into out-of-the-way corners.
3. Moving discharge heats up plant quickly on cold mornings.
4. Reduces absenteeism due to colds resulting from drafts, chills or overheating.
5. Is an excellent cooling system in summer with steam off and fans on.

NOT just another unit heater, the WING REVOLVING HEATER is unique in that it does what no other heater can do—its slowly revolving outlets gently distribute the heat continuously in a constantly changing direction. It reaches over, around and under obstructions and into out of the way corners. WING REVOLVING HEATERS are in many of the country's leading railroad shops.

L. J. Wing Mfg. Co.
52 SEVENTH AVE., NEW YORK 11
FACTORIES:
NEWARK, N. J. *MONTREAL, CAN.*

FIND OUT HOW

MOLINE
SPECIALLY DESIGNED MACHINE TOOLS
can cut production costs
at the
MACHINE TOOL SHOW
in Chicago · Booth No. 128

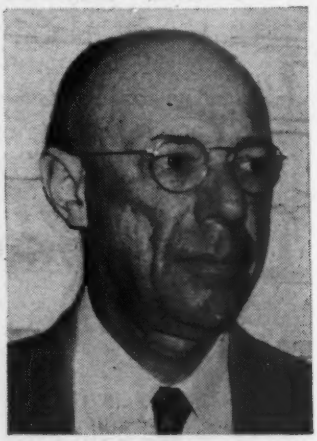
MOLINE TOOL CO.
Moline, Illinois

1926, he was appointed master car builder of the Gulf Coast Lines and the International-Great Northern, with headquarters

L. R. Christy

at Houston, Tex., and on February 28, 1941, superintendent of the car department of the Missouri Pacific lines.

A. T. MILLER, whose appointment as superintendent motive power of the Atlanta & West Point, the Western of Alabama, the Georgia and the Atlanta Joint Terminals, with headquarters at Atlanta, Ga., as reported in the August issue, was born at Louisville, Ky., on November 5, 1889. He served in various minor jobs in the shops and roundhouses and as timekeeper and accountant with the Chicago, Rock Island & Pacific, the Atchison, Topeka & Santa Fe and the Southern Pacific. In

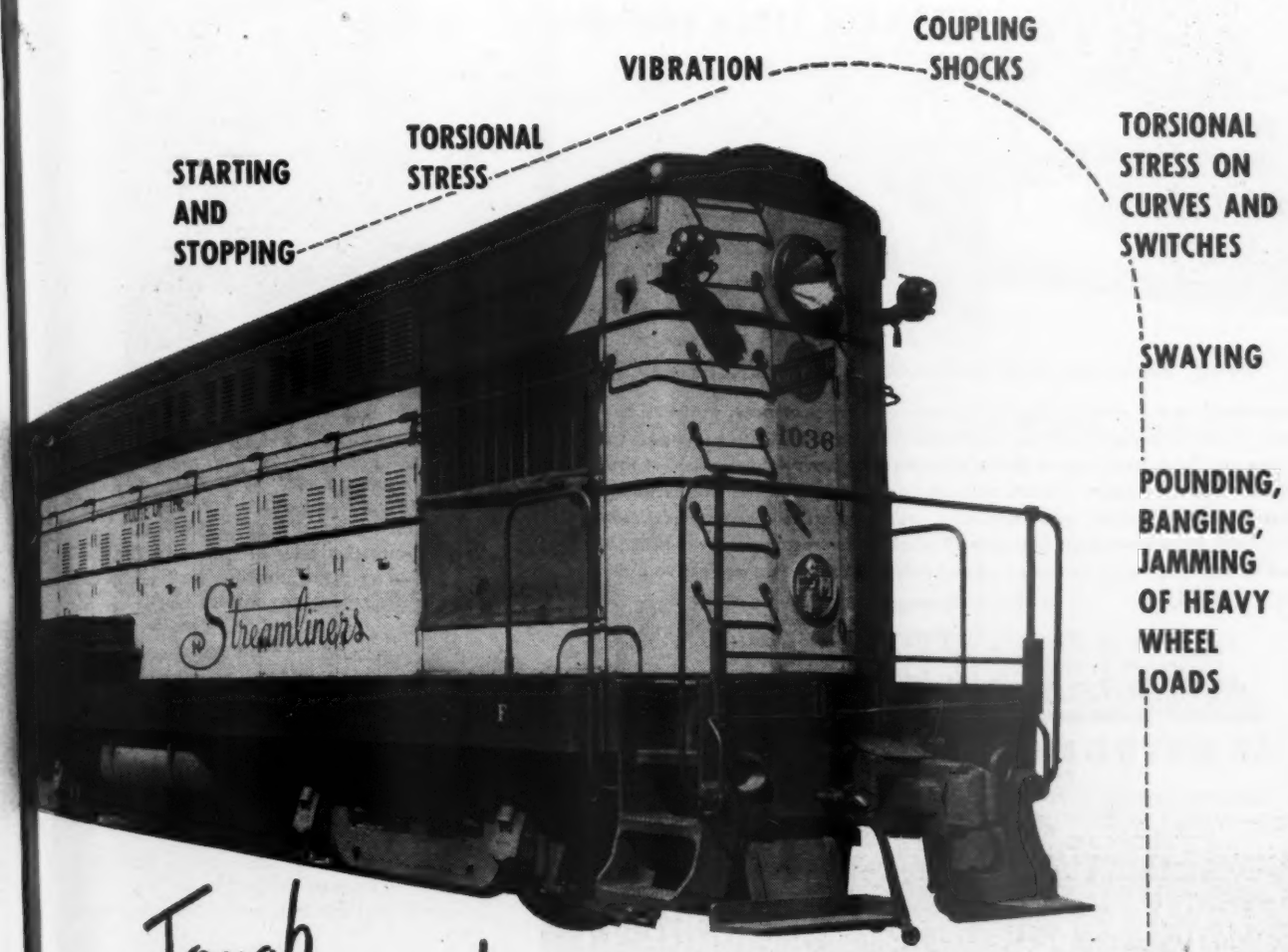


A. T. Miller

August, 1914, Mr. Miller went with the Atlanta & West Point, the Western of Alabama and the Georgia. From November, 1927, to January 1, 1938, he was assistant to superintendent motive power and from 1932 to 1937, he was also general storekeeper. Mr. Miller was appointed master mechanic on January 1, 1938, and on November 12, 1943, he became assistant superintendent motive power.

W. F. KASCAL, master mechanic of the Colorado & Southern (part of the Burlington System) at Denver, Colo., has been appointed superintendent of motive power with headquarters at Denver. Mr. Kascal was born on October 20, 1901, and entered

For additional information, use postcard, pages 55-56



Tough punishment yet bolted parts stay tight!

This switch engine has a tough job making up freight and passenger trains under many and varying conditions. Shopping time for maintenance and maintenance costs must be kept to a minimum.

RELIANCE LOCOMOTIVE HY-CROME SPRING WASHERS are made to specifications for the various bolted assembled points to help reduce shopping time and lower costs. They automatically compensate for looseness resulting from wear, keeping bolts under the proper calibrated tension and bolted assemblies stay *tighter longer.*

WRITE for Reliance Motive Power Folder and learn how Locomotive Hy-Crome Spring Washers can help solve your fastening problems at more than fifty points on locomotives and rolling stock.

Reliance LOCOMOTIVE HY-CROME spring washers

EATON
EATON MANUFACTURING COMPANY

RELIANCE DIVISION
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Feed, Measure, Cut-Off—AUTOMATICALLY

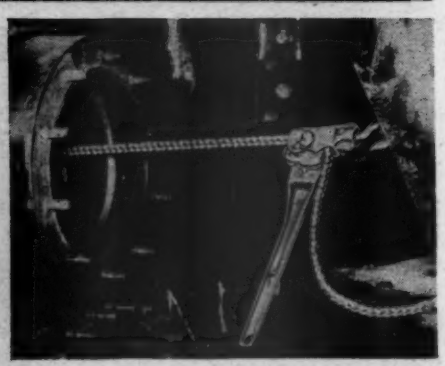
These automatic stock push-up hack saw machines are not new. MARVEL built the first practical bar feed hack saw machines, over 30 years ago. The sound, proven, basic principle of these machines has never changed—but they have been constantly improved and refined. Today they are still the leaders—the most practical, fastest, most accurate, most productive cutting hack saw machines built. No matter what your cut-off work, let us recommend the MARVEL saw that will give you true economy, speed and accuracy at an attractive price.

Write for Catalog

Metal Cutting MARVEL SAWS
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave. Chicago 39, U. S. A.

Extra SAFETY... *Extra* DURABILITY
... *Extra*
OPERATING EASE...
WITH
COFFING
SAFETY-PULL HOISTS

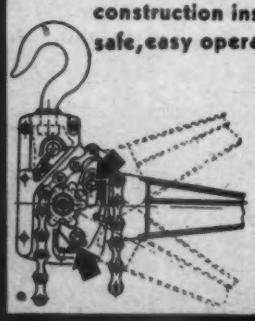


Pulling Locomotive Piston

Check these features that give longer hoist life, greater ease of operation—

- Hooks of drop forged heat treated steel
- Reversible handle permits operation in any position
- "Safety Load" handle—bends before other parts will break
- Each model pre-tested to 100% overload
- Coffing exclusive dual ratchet and pawl assembly for maximum safety
- Nine models in capacities from ½ to 15 tons

Sturdy, simple pawl construction insures safe, easy operation.



Write for Bulletin RL-3

COFFING HOIST CO.
DANVILLE • ILLINOIS

RATCHET LEVER HOISTS • LOAD BINDERS • SPUR GEAR HOISTS • ELECTRIC HOISTS • DIFFERENTIAL HOISTS TROLLEYS

the service of the Burlington in 1922 as a machinist, at Brookfield, Mo. In 1927 he was appointed enginehouse foreman and

W. F. Kascal

served at various points until July 1, 1939, when he became general foreman, at Lincoln, Neb. On April 27, 1943, Mr. Kascal was appointed master mechanic of the C. & S., at Denver, the position he held at the time of his recent promotion.

Diesel

E. WRIGHT has been appointed Diesel locomotive inspector of the New York Central System, with headquarters at New York.

J. G. HUNT has been appointed general Diesel instructor of the New York Central System, with headquarters at New York.

SIDNEY BAGGOTT has been appointed Diesel locomotive inspector of the New York Central System, with headquarters at New York.

M. SHIRILLA has been appointed Diesel locomotive inspector of the New York Central System, with headquarters at New York.

J. E. BOLAND has been appointed Diesel locomotive inspector of the New York Central System, with headquarters at New York.

W. E. VERGAN, supervisor of air brakes of the Missouri-Kansas-Texas at Denison, Tex., has been appointed superintendent of air equipment and Diesel operations, with headquarters in Denison.

A. J. RITTER has been appointed Diesel locomotive inspector of the New York Central System, with headquarters at New York.

J. J. KEATIG has been appointed Diesel instructor of the New York Central System, with headquarters at New York.

H. G. NORTON has been appointed Diesel locomotive inspector of the New York Central System, with headquarters at New York.

J. W. EVERITT has been appointed Diesel locomotive inspector of the New York Central System, with headquarters at New York.

Electrical

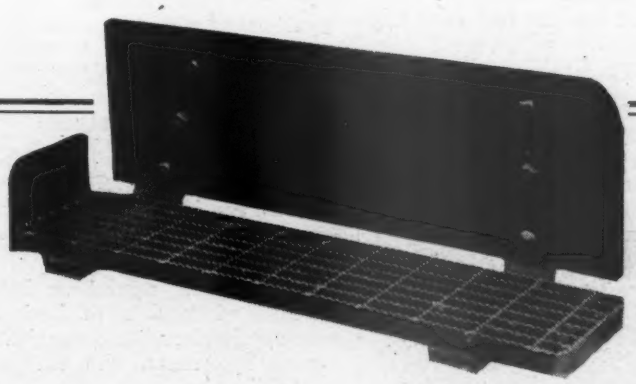
W. H. CHAPMAN, whose appointment as chief electrical engineer of the Chicago & North Western, at Chicago, was reported

ARE YOU BEING THROWN FOR A LOSS

by accidents and maintenance costs?

APEX SAFETY SWITCH ENGINE FOOTBOARDS

- REDUCE ACCIDENTS
- REQUIRE NO MAINTENANCE



First open work metal footboard approved by A. A. R. Only footboard whose I. C. C. and A. A. R. approval was based on a 3-year test in actual service.

APEX Tri-Lok steel footboards are hot-dip galvanized after assembly, to insure long life.

These new APEX Tri-Lok footboards, in use on more than 300 Diesels and steam switchers, are the safest footboards made. Their 85% open construction prevents accumulation of snow, ice, grease, and dirt. Easily installed, they require absolutely no maintenance, and last the lifetime of the locomotive.

WRITE US FOR DETAILS

APEX **RAILWAY PRODUCTS CO.**

332 SOUTH MICHIGAN AVENUE
CHICAGO 4, ILLINOIS

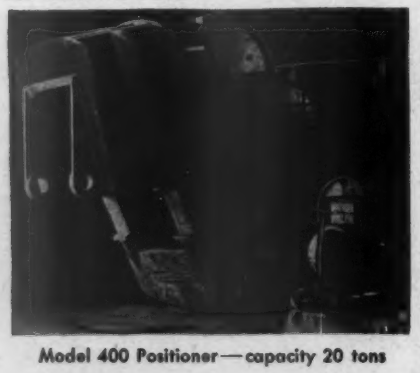
Motor-operated Bench Positioner Model IP capacity 100 lbs

Better Your *PROFIT* Position with a better *WELDING* Position

When you position the work for *downhand* welding with a Ransome Positioner, you gain these advantages:

- Production increases up to 50%.
- Labor savings up to one-half.
- Better quality work, with smoother, stronger welds.
- Reduction in welding rod waste 5% to 7%.
- Reduction in crane service and accident hazards.

No matter what railroad equipment you wish to position, Ransome can furnish equipment to handle it. Send for Bulletin 210B.



Model 400 Positioner—capacity 20 tons

Industrial Division

Ransome MACHINERY COMPANY

Dunellen, N. J.

Subsidiary of

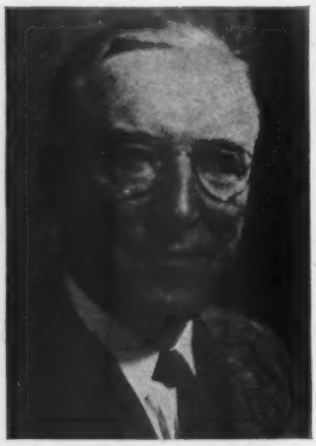
WORTHINGTON

Pump and Machinery Corporation

Y-7-8A

Ransome Positioners and Turning Rolls . . . Capacities 100 Lbs. to 75 Tons

in the August issue, was born at Lyland, England, on August 26, 1886. He was educated at the Salford Royal Technical School, Salford, England, and held a number of positions in England after graduating. In 1910 he came to the United States and served successively with the Commonwealth Edison Company, Chicago, and the Chicago Bell Telephone Company. Mr.



W. H. Chapman

Chapman entered railway service in 1911 as an electrician in the employ of the North Western at Chicago. In 1914 he was appointed to chief electrician, with headquarters at Clinton, Iowa, in 1916, electrical inspector, with headquarters at Chicago; in 1927 assistant electrical engineer, and in January, 1945, electrical engineer.

Car Department

F. J. HIERS, foreman light repair yard, Seaboard Air Line, at Portsmouth, Va., has been appointed assistant superintendent car department, with headquarters at Portsmouth.

H. S. MARSH, general car inspector of the Missouri Pacific at St. Louis, Mo., has been appointed assistant superintendent of the car department, with headquarters at St. Louis.

W. C. BAKER, SR., general car foreman of the Seaboard Air Line at Tampa, Fla., has been appointed assistant superintendent car department, with headquarters at Tampa.

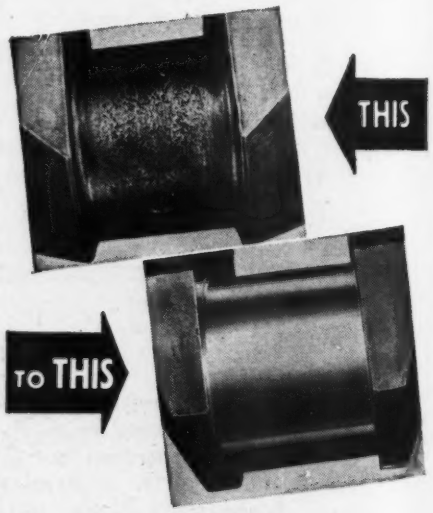
T. C. PERKINS, general foreman car department of the Central of Georgia at Macon, Ga., has been appointed superintendent car department, with headquarters at Savannah, Ga. Mr. Perkins entered the service of the Central of Georgia on March 13, 1929, as A.A.R. clerk at Industry, Ga. He became assistant car shop foreman at Columbus, Ga., on September 1, 1932, and general foreman car department at Macon on May 1, 1938.

CHARLES H. EITEL, has been appointed general foreman passenger car repairs of the Central of Georgia, with headquarters at Savannah, Ga., Mr. Eitel's entire service with the Central of Georgia has been at Savannah, where he was first employed as a clerk in the accounting department in October, 1911. One month later he was transferred to the mechanical department as apprentice draftsman. He became a draftsman in April, 1917; was appointed chief

Don't SCRAP Crankshafts

RECLAIM THEM WITH THE . . .

BINGHAM SLEEVING PROCESS*



● You no longer need to commit all crankshafts to the scrap heap because journals are badly scored or burned. Many can be renewed to manufacturers' specifications by the new Bingham Sleeving Process. Saves *thousands* of dollars in motive power maintenance by prolonging crankshaft life. Let us send you the details.

For prices and literature, write today to Department RME-1

paxton

DIESEL ENGINEERING COMPANY

Omaha 5, Nebraska

*Pat. Applied For

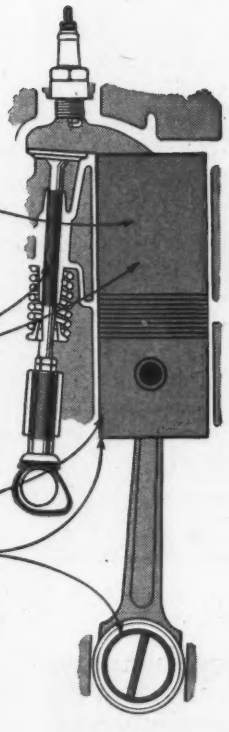
CALOL RPM

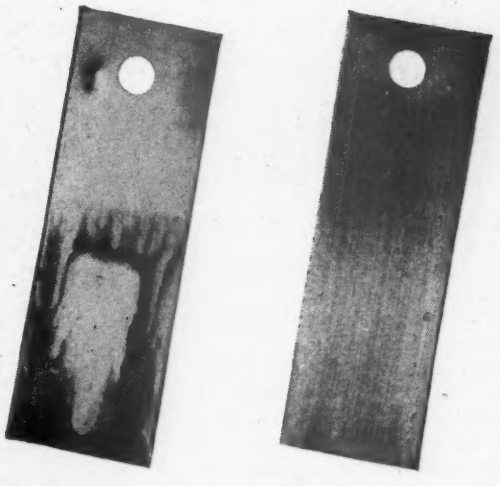
① Adhering agent in RPM Compounded Motor Oil keeps oil film on all parts after engine stops, even on cylinder walls.

② Rustproofing compounds prevent moisture that condenses on cooling parts from contacting metal.

③ No rust is formed to scrape off when engine starts, and cause excessive wear.

④ Constant lubricant film provides adequate and instant lubrication when engine starts.





This actual photograph shows how one HIGH-QUALITY MOTOR OIL "peeled" off almost all of this test strip of steel when it was placed in corrosive-moisture conditions similar to those in a cooling engine. The oil concentrated at one spot and the unprotected surface quickly rusted.

RPM COMPOUNDED MOTOR OIL kept this strip bright and shiny, completely sealed against rusting, when it was exposed to the same conditions. "RPM" compounds keep a constant rust-proofing lubricant film on engine parts at all times, whether they are idle or moving.

How RPM Motor Oil Rust-Proofs As It Lubricates

Rusting, caused by corrosive moisture, is the greatest source of wear in automotive engines (85%, according to some engineers). It can be controlled by using RPM Compounded Motor Oil.

Additional compounding for "RPM," perfected by Standard of California scientists, provides a rust-proofing lubricant film on internal engine surfaces. The heaviest moisture condensation in idle or cold-running engines will not cut through it.

Other compounds in RPM Motor Oil give it adherent qualities so the film stays on parts at all times. They also loosen and remove gum and lacquer, lubricate hot spots, resist sludge formation, bearing corrosion and stop foaming.

Trademark "RPM" Reg. U. S. Pat. Off.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Colo.; Standard Oil Company of Texas, El Paso, Texas.

FOR EVERY NEED A **STANDARD OF CALIFORNIA** JOB-PROVED PRODUCT

Fabricators and Car Builders agree that material handling time is the chief factor in the *economics of production.*

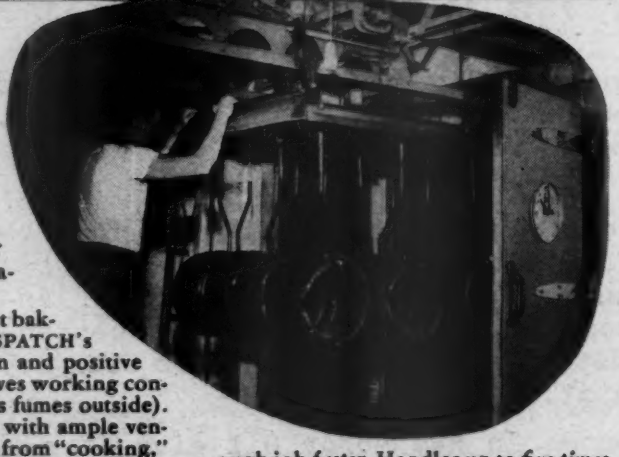
The Thomas Automatic Spacing Machine is the solution to the handling problem. In addition it eliminates the need for marking and assures proper spacing of rivet holes in limitless number of pieces. Thus costs are substantially reduced and production speeded.

Write for Bulletin 306

THOMAS
MACHINE MANUFACTURING COMPANY
PITTSBURGH, 23, PA.

16

Boosts Baking Output 100% in Electric Motor Repair Shops



You can lick the electric motor shortage with this *fast, efficient* oven for drying and baking jobs. Many shops report 100% increase in production with DESPATCH Ovens for coil, stator and armature baking.

Insure yourself against baking failures with DESPATCH's uniform heat circulation and positive fresh air intake. (Improves working conditions, too . . . exhausts fumes outside). Forced convection heat with ample ventilation prevents varnish from "cooking," peeling or cracking . . . gives speedy removal of moisture and volatile vapors. Automatic temperature control and high velocity airflow guarantee high quality baking.

For DIESEL-ELECTRIC armatures and motors a DESPATCH Oven does a thorough job *faster*. Handles up to *five times as many* heavy traffic motors as older equipment. Economical to operate . . . easy to load and unload . . . *safe* (Factory Mutual approved).

DESPATCH OVEN COMPANY

Minneapolis Office: 619 S. E. 8th St.
Chicago Office: 221 N. LaSalle St.
Offices in All Principal Cities

DESPATCH OVEN COMPANY

WRITE TODAY for information

draftsman on September 1, 1937; engineer of tests on April 1, 1938, and superintendent car department on May 1, 1944.

O. H. CLARK, assistant superintedent of the car department of the Missouri Pacific at St. Louis, Mo., has been appointed superintendent of the car department, with headquarters at St. Louis.

Master Mechanics and Road Foremen

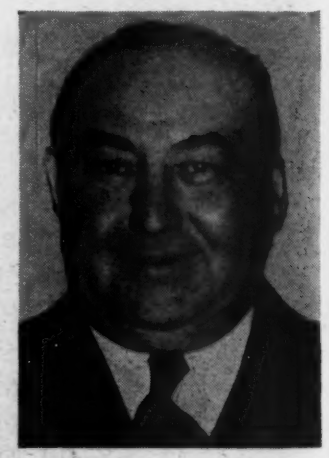
R. FRANK HARRILL, master mechanic of the Southern at Charleston, S. C., has retired after more than 38 years of service.

J. HOMER STALLINGS, general foreman of the Southern at Alexandria, Va., has been appointed master mechanic at Charleston, S. C.

Obituary

H. C. ARGAST, superintendent of the St. Louis Refrigerator Car Company, and superintendent of the car department of the Manufacturers Railway Company and the St. Louis & O'Fallon, at St. Louis, Mo., died in that city on July 9.

Mr. Argast was born at St. Louis on January 16, 1891. He entered the service of the American Car & Foundry Co. in 1910, as a piece-work checker in the finishing shop. In September, 1913, he joined the American Refrigerator Transit Company as a clerk in the mechanical department. He was released from armed forces on July 22, 1919, returned to the American Refrigerator Transit Company in his former capacity, and was promoted to chief clerk of the mechanical department on September 1, the same year. He entered



H. C. Argast

the service of the St. Louis Refrigerator Car Company on October 16, 1922, as chief clerk in the mechanical department, and was promoted to superintendent on November 6, 1925. On January 16, 1937, he was appointed superintendent of the car department of the Manufacturers and of the St. Louis & O'Fallon, assuming these duties in addition to his duties as superintendent of the St. Louis Refrigerator Car Company. Mr. Argast was a member of the Car Department Officers' Association, one of the prime movers in the reorganization of the Car Department Association of St. Louis in 1937, and a life member of the Mechanical division of the Association of American Railroads.